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Volume II -Body of Report
Volume III -Appendices
Volume IV -Classified Appendix

Item 20: ● Manpower requirements
● Manpower costs
● Total ship operating cost (including maintenance and overhaul costs)
● Mission fulfillment capability
● Operating policy
● Risks
● Total fleet and merchant marine labor market effect
● Alternative Operating Concepts

This report does not reach conclusions or make recommendations, but rather is intended to present documented findings to be considered by the decision maker along with military, national security and economic judgements in determining a direction and scope for further action.

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VOLUME II
NARRATIVE REPORT

*INVESTIGATION
OF
THE POTENTIAL
FOR
INCREASED USE
OF
CIVILIAN
MANNING
IN FLEET SUPPORT SHIPS
CIVMAN*



FINAL REPORT

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INVESTIGATION OF THE POTENTIAL
FOR INCREASED USE OF CIVILIAN
MANNING IN FLEET SUPPORT SHIPS

VOLUME II

NARRATIVE

Alfred S. Rhode, PhD.
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Arlington, Virginia 22202

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1. Enclosures (1) and (2) are forwarded for information.
2. The CIVMAN study examined the costs, risks, capabilities and benefits of manning Navy fleet support ships, alternatively, with Navy Civil Service Mariners and commercial contract mariners. This examination, made at a time of severe fiscal constraint and a potential future military manpower shortfalls, is but one of several initiatives being pursued to redress the supply-demand problem in the context of total force manpower management. Other initiatives include, but are not limited to: Naval Reserve augmentation; assignment of women to sea duty; selected military detachments for high tempo operations; and control of manpower requirements growth through full consideration of manpower constraints in the design and acquisition of new fleet support platforms and equipments.
3. The CIVMAN study provided information on civilian operation of fleet support ships in a peacetime environment. It did not, however, adequately address the following items critical during a war or contingency:
 - a. Crew Endurance - The smaller civilian crews proposed in this study would have difficulty in maintaining round-the-clock operations. Fatigue and loss of stamina in such operations would directly affect fleet combatant vulnerability during underway replenishment operations.
 - b. Many ship functions are lost when a ship is demilitarized. As a result, a civilian manned ship experiences such reduced capabilities as lack of combat information

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center, lack of anti-air warfare defense, limited damage control, and reduced ability to conduct high tempo task group operations, and fewer UNREP stations than are currently specified in the Required Operational Capabilities.

c. With the limited ammunition and nuclear weapon security projected in the study, vulnerability to terrorist activity may increase.

While some of the reduced capability, outlined above, can be restored with additional civilian or military manpower, such a crew increase could have an impact upon reconfiguration cost and on manpower costs. A cost analysis, similar to that performed in the study, would be required to determine the impact of any change in the capabilities of these ships.

4. In conclusion, the study provides the Navy with an excellent baseline for consideration of increased civilian manning. However, this study must be considered in conjunction with the developing concepts for assignment of women to sea duty and the use of naval reserves to augment Navy manning to ensure a complete perspective for decision formulation. Additionally, the significance of the reduced endurance of civilian crews and the loss of ship functions which are critical during war or contingency situations, as well as the other previously noted considerations, must be evaluated.

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Director, Navy Program
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FOREWORD

The CIVMAN study examined the costs, risks, capabilities and benefits of manning Navy fleet support ships, alternatively, with Navy Civil Service Mariners and commercial contract mariners. This examination, made at a time of severe fiscal constraint and a potential future military manpower shortfall, is one of several alternatives being evaluated in the Navy's total force evaluation. Other alternatives include the assignment of women to sea duty and use of naval reserves to augment reduced Navy military ships.

ISI gratefully acknowledges the assistance of the Working Group Members, the many people in the Office of the Chief of Naval Operations, Naval Sea Systems Command, the Military Sealift Command and the U.S. Maritime Administration. We are especially indebted to Mr. Irving Blickstein, (OP-964C), the Project Officer, for his constant advice; and CAPT Raymond Helms, USN for his counsel during the conduct of the study. Commanders William Dietrich and Edward Brewton, USN, were particularly helpful in assisting the Working Group with their commentary on points of view that invariably surfaced during the course of the study. We also wish to acknowledge the very able assistance of Mr. Kenneth Hylind, Ms. Betty Ferreira, Mr. Dudley J. Clapp, Jr., and Mr. Louis Tippet of the Military Sealift Command, as well as Mr. Arthur Friedberg, Mr. Thomas Connors and Ms. Esther Love of the U.S. Maritime Administration.

SUMMARY

A total of 95 fleet support ships were considered, including underway replenishment, repair, towing, salvage, and submarine rescue ships. The study covered the three manning alternatives with respect to the following factors:

- a. Operating Policy;
- b. Manpower Requirements;
- c. Manpower Costs;
- d. Total Ship Operating Costs (including maintenance, overhaul, and reconfiguration costs);
- e. Effect on Mission Fulfillment Capability;
- f. Risks to the Navy; and
- g. Total Fleet and Merchant Marine Labor Market Effect.

The major findings of the study include:

a. Navy military manning has the highest manning requirement. Navy Civil Service and commercial contract manning are roughly equivalent--differences exist because of estimating techniques rather than differing requirements.

b. Navy Civil Service manning is always the least-cost alternative, with annual amortized per ship, per year savings of from \$.2M to \$4.6M. (Expressed in FY-77 dollars, based upon a modified life cycle cost analysis with SCN costs omitted.)

c. Both civilian manning options will result in a reduction in capability (e.g., no CIC, no AAW, reduced damage control, fewer UNREP stations).

d. Both civilian manning options increase the risk to the Navy. Although the risk is difficult to quantify, and in some cases is only perceived, the study summarized it as follows:

(1) Military Control - reduced in civilian manned ships.

(2) Stability of Work Force - potential advantage in civilian options because over time, a large cadre of specially trained civilian personnel with fleet support experience would be available in time of a contingency.

(3) Manpower Availability - at the time of the study there was a civilian manpower surplus; currently there are spot shortages, i.e., diesel engineers.

(4) Age of Sailors - civilian mariners older (average age 48)--however, more experienced in basic maritime skills. Experience level could fall if a large number of ships were transferred over a short period.

(5) Ability to Maintain the Ship - no discernible difference based on MSC operation of 13 fleet support ships.

(6) Legal - personal services contracting and Government liability under commercial contract manning option might require legislation.

(7) Potential Strike Threat - Past performance indicates that a strike is improbable. A "no-strike" agreement might be obtainable.

(8) Endurance - small Navy Civil Service and commercial contract crews result in a reduced ability to meet increased operating tempo conditions during a contingency.

e. The study reports that if all 95 ships studied were converted to Navy Civil Service manning:

(1) The cost savings to the Navy would be \$271M per year (economic costs) if the assumed civilian manning levels are acceptable. The savings, however, are based on a quick survey of one representative ship of each type, and the assumption that the civilian manning levels are acceptable. These savings would diminish if crew sizes increase to provide greater capability or if reconfiguration/overhaul conversion costs are understated.

(2) This would transfer 11,873 jobs to the Civil Service sector.

(3) This could reduce a total of 27,000 Navy billets. Similar figures are derived for commercial contract manning.

The CIVMAN study provided adequate information on civilian operation of fleet support ships in a peacetime environment. It did not, however, adequately address the following items critical during a war or contingency:

a. Crew Endurance - The smaller civilian crews proposed in this study would have difficulty in maintaining round-the clock operations. Fatigue and loss of stamina in such operations would directly affect fleet combatant vulnerability during underway replenishment operations.

b. Many ship functions are lost when a ship is demilitarized. As a result, a civilian manned ship experiences such reduced capabilities as lack of combat information center, lack of anti-air warfare defense, limited damage control, reduced ability to conduct high tempo task group operations, and fewer UNREP stations than are currently specified in the Required Operational Capabilities.

c. With the limited ammunition and nuclear weapon security projected in the study, vulnerability to terrorist activity may increase.

While some of the reduced capability, outlined above, can be restored with additional civilian or military manpower, such a crew increase could have an impact upon reconfiguration cost and on manpower costs. A cost analysis, similar to that performed in the study, would be required to determine the impact of any change in the capabilities of these ships.

In conclusion, the study provides the Navy with an excellent baseline for consideration of increased civilian manning. However, this study must be considered in conjunction with the developing concepts for assignment of women to sea duty and the use of naval reserves to augment Navy manning to ensure a complete perspective for decision formulation. Additionally, the significance of the reduced endurance of civilian crews and the loss of ship functions which are critical during war or contingency situations, as well as the other previously noted considerations, must be evaluated.

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| Navy Civil Service Manning - | | | | | | | | | | | | | |
| Civil Service Personnel | A21 | A20 | A19 | A18 | A22 | A23 | A26 | A25 | A24 | A27 | A28 | A29 | A30 |
| Military Detachment | A34 | A33 | A32 | A31 | A35 | A36 | A39 | A38 | A37 | A40 | A41 | A42 | A43 |
| Commercial Contract Manning - | | | | | | | | | | | | | |
| Civilian Personnel | A47 | A46 | A45 | A44 | A48 | A49 | A52 | A51 | A50 | A53 | A54 | A55 | A56 |
| Military Detachment | A60 | A59 | A58 | A57 | A61 | A62 | A65 | A64 | A63 | A66 | A67 | A68 | A69 |
| MANPOWER COSTS - Navy Military Manning | A87 | A86 | A85 | A84 | A88 | A89 | A92 | A91 | A90 | A93 | A94 | A95 | A96 |
| Navy Civil Service Manning - | | | | | | | | | | | | | |
| Civil Service Personnel | A109 | A108 | A107 | A106 | A110 | A111 | A114 | A113 | A112 | A115 | A116 | A117 | A118 |
| Military Detachment | A122 | A121 | A120 | A119 | A123 | A124 | A127 | A126 | A125 | A128 | A129 | A130 | A131 |
| Commercial Contract Manning - | | | | | | | | | | | | | |
| Civilian Personnel | A137 | A136 | A135 | A134 | A138 | A139 | A142 | A141 | A140 | A143 | A144 | A145 | A146 |
| Military Detachment | A150 | A149 | A148 | A147 | A151 | A152 | A155 | A154 | A153 | A156 | A157 | A158 | A159 |
| TOTAL COST ANALYSIS - FYDP Cost | | | | | | | | | | | | | |
| Navy Military Manning | B16 | B15 | B14 | B13 | B17 | B18 | B21 | B20 | B19 | B22 | B23 | B24 | B25 |
| Navy Civil Service Manning | B40 | B39 | B38 | B37 | B41 | B42 | B46 | B45 | B44 | B47 | B48 | B49 | B50 |
| Commercial Contract Manning | B65 | B64 | B63 | B62 | B66 | B67 | B71 | B70 | B69 | B72 | B73 | B74 | B75 |
| Charge in Navy Billet Requirements | C12 | C12 | C12 | C12 | C12 | C12 | C12 | C12 | C12 | C12 | C12 | C12 | C12 |
| MISSION CAPABILITY ANALYSIS | | | | | | | | | | | | | |
| Primary and Secondary Mission Areas | E3 | E3 | E3 | E3 | E3 | E3 | E3 | E3 | E3 | E3 | E3 | E3 | E3 |
| MUSF Ships Limiting Period of UNREP Operations | E6 | E6 | E6 | E6 | E6 | E6 | E6 | E6 | E6 | E6 | E6 | E6 | E6 |
| Summary Comparison Fleet Support Ship Operational Capabilities | E11 | E11 | E11 | E11 | E11 | E11 | E11 | E11 | E11 | E12 | E12 | E12 | E12 |

REPRESENTATIVE SHIP DATA TABLES IN CIVMAN REPORT (Vols 3 & 4 Appendices)

Data Table

Ship Type

| | AOE | AOR | AFS | AF | AE | AO | AR | AS | AD | ARS | ASR | ATF | ATS |
|-----------------------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| REDUCED OPERATING STATUS (ROS) ANALYSIS FOR MLSP SHIPS | | | | | | | | | | | | | |
| ROS Case I | | | F7 | | F7 | F7 | | | | | | | |
| ROS Case II | | | F8 | | F8 | F8 | | | | | | | |
| Unmanned Lay-up Coat | | | F14 | | F14 | F14 | | | | | | | |
| Manpower Requirements Summary | | | F17 | | F19 | F18 | | | | | | | |
| ECONOMIC COSTS - Navy Military Manning | | | | | | | | | | | | | |
| Undiscounted | J1 | J1 | J1 | J1 | J1 | J1 | J2 | J2 | J2 | J3 | J3 | J3 | J3 |
| Discounted | J4 | J4 | J4 | J4 | J4 | J4 | J5 | J5 | J5 | J6 | J6 | J6 | J6 |
| Navy Civil Service Manning - Undiscounted | J8 | J8 | J8 | J8 | J8 | J8 | J9 | J9 | J9 | J10 | J10 | J10 | J10 |
| Discounted | J11 | J11 | J11 | J11 | J11 | J11 | J12 | J12 | J12 | J13 | J13 | J13 | J13 |
| Navy Commercial Contract Manning - Undiscounted | J15 | J15 | J15 | J15 | J15 | J15 | J16 | J16 | J16 | J17 | J17 | J17 | J17 |
| Discounted | J18 | J18 | J18 | J18 | J18 | J18 | J19 | J19 | J19 | J20 | J20 | J20 | J20 |
| MISSION FULFILLMENT CAPABILITIES | K13 | K10 | K7 | K4 | K16 | K19 | K28 | K25 | K22 | K31 | K34 | K37 | K40 |

I. INTRODUCTION

A. STATEMENT OF PURPOSE

This report examines the effects on operating policy, manpower requirements, cost, mission fulfillment capability, risks and labor market resulting from increased use of civilian manning on Navy fleet support ships. This report does not reach conclusions or make recommendations, but rather is intended to present documented findings to be considered by the decision maker along with military, national security and economic judgements in determining a direction and scope for further action.

B. METHOD OF ANALYSIS

1. Approach

The evaluation and comparison of the two manning alternatives, Navy Civil Service manning and Commercial Contract manning, with Navy Military Manning were conducted with respect to the following key factors:

- Manpower requirements
- Manpower costs
- Total ship operating cost (including maintenance and overhaul costs)
- Mission fulfillment capability
- Operating policy
- Risks
- Total fleet and merchant marine labor market effect
- Alternative Operating Concepts

2. Manpower Requirements

For the Navy military manning case, manpower requirements were extracted from Ship Manning Documents (SMDs). Manpower requirements for the Navy Civil Service and Commercial Contract manning cases were provided by the Commander, Military Sealift Command (COMSC) and the U.S. Maritime Administration (MARAD) respectively. MARAD provided the manning levels for the Commercial Contract mariners. The Study Team provided the manning for those functions not filled by Commercial Contract Mariners by adding to basic military detachments previously established by COMSC. To facilitate the analysis of crew comparisons, the Navy SMDs were restructured on a functional basis to match merchant marine ship department assignments and ratings¹. They are described in detail in Appendix A of Volume III.

3. Manpower Costs

Two separate manpower cost estimates were computed for each manning alternative. The first of these is an estimate of the differential amount which must be budgeted for each alternative and, as such, may be inserted directly into the Five Year Defense Plan (FYDP). The second set of cost estimates are of the true differential economic

¹Both COMSC and MARAD generally adhere to merchant marine organization and management practices aboard ships crewed by Civil Service and merchant seamen.

costs (discounted and undiscounted) of each alternative. These latter estimates represent true differential resource cost as compared to the annualized cost structure of the FYDP.

4. Ship Operating, Maintenance and Overhaul Costs

For each ship type, the operating, maintenance, overhaul and overhead cost estimates were computed for the three manning alternatives and combined with their respective manpower cost estimate, to provide an estimate of total ship operating cost for each manning alternative.

5. Mission Fulfillment Capability

An analysis of capabilities was performed utilizing the Navy Military Manning (assumed to be 100% capable) as the basis for evaluating the civilian manning alternatives. Specific task areas for each type of ship under study were extracted from the applicable Navy Required Operational Capability (ROC) Statements. Because MSC presently operates only three types (AO, AF, ATF) ships under study, and none of these ships has ever been manned on a commercial contract basis, a fully quantitative evaluation could not be made. Therefore, a qualitative letter grade was assigned to indicate full or partial capability in achieving the ROC task areas. An impact statement is provided to explain any degradation in capability resulting from transition to civilian manning.

6. Operating Policy

The impact of increased use of civilian manning in terms of required policy changes was identified by an examination of the potential operating problems which could be encountered with civilians replacing military personnel. An examination of changes in procedures required by the non-combatant role of civilian personnel was also conducted and possible implementing policy changes were developed. In addition, functional capabilities and procedures were examined for possible changes in policy.

7. Risks

Potential risks associated with each of the civilian manning alternatives were identified and evaluated, relative to the probability of occurrence and potential impact upon fleet support performance.

8. Total Fleet and Merchant Marine Labor Market Effect

The manpower requirement developed early in the study for the 13 basic support ship types were applied to the entire 95 support ship fleet for both civilian manning alternatives. The resulting total manpower requirements were superimposed on the existing maritime labor market and the ability of the market to sustain such a demand was examined.

9. Alternate Operating Policies

During the conduct of the study, it became apparent that transferring UNREP ships to civilian manning would result in excess peacetime capacity. The study group analyzed this excess and developed a Reduced Operating Status (ROS) concept which could potentially save significant funds in peacetime without degrading naval capability in wartime.

10. Report Organization

a. The report is organized into four (4) volumes. Volume I is the Executive Summary. Volume II contains a description of the operations analysis conducted to develop the findings presented herein. Volumes III and IV contain appendices which provide the in-depth analyses used in developing study data. Volume IV is separated from Volume III because of the classified nature of the data it contains.

b. Section II of this volume (Volume II) describes the history of the development of the fleet support ships and the organizations that direct and operate them. Section III briefly discusses the steps taken in determining the manpower requirements for both military and civilian manning. This data serves as a basis for both the manpower and total cost analysis which is developed in Section IV and for the Mission Fulfillment Capabilities discussed in Section V. The Operational Risks involved in

possible extension of civilian manning are covered in Section VI, followed by a discussion in Section VII of the impact of such a change on Fleet Support Policies. The Reduced Operating Status (ROS) concept is described in Section VIII with the detailed cost analysis contained in Appendix F, Volume III. A Summary of Findings (Section IX) provides fleet wide summations and overall implications, in addition to a summary of the study results.

C. ASSUMPTIONS

In order to perform the study described herein, certain assumptions were necessary. These are briefly stated in the following paragraphs.

1. Manpower

- The analysis compares peacetime operations of three manning alternatives
- All Navy Military Manned Fleet Support ships are manned to 100% of organizational manpower requirements of the Ship Manning Document.
- The Navy Civil Service and Commercial Contract manned fleet support ships are manned to Condition III, i.e., operating as necessary to conform with prescribed Required Operational Capabilities (ROCs).
- Readiness Condition III includes the opportunity for eight hours of rest provided per man per day and an expected crew endurance of 60 continuous days. (See Section IV for full description).

- Civil Service and Commercial Contract crews do not man self defense stations.

2. Cost of Manning Alternatives

- The Composite Standard Military Rates used in the cost analysis are representative of Navy FYDP costs.

- At the end of the first operating year military detachments will be reduced in some functional areas where civilians have gained the necessary experience to replace military personnel.

- Any ship budgeted for entry into the fleet during the FYDP years will be constructed to meet civilian habitability standards if civilian manning is expanded.

- The ships in Table I-1 have hulls representative of the thirteen (13) types of ship studied. These were selected by the Study Group because they also best represent each of the types that would be in the force structure for the planning years.

3. Mission Fulfillment Capabilities

- Underway Replenishment (UNREP) productivity is determined by the number of replenishment stations manned and operating. (Considers both vertical (VERTREP) and connected (CONREP) replenishment stations.)

- Navy Civil Service seamen and Commercial Contract seamen are equally competent at comparable tasks.

- Navy Military manned ships' capability is the comparison baseline for all missions.

TABLE I-1
CATEGORIES AND TYPES OF SHIPS STUDIED

| <u>Type/Class/Ship</u> | <u>Function</u> | <u>Number Operating</u> |
|---------------------------------------------|---------------------|-----------------------------|
| <u>MLSF Station Ships</u> | | |
| AOE-3 | Fast Combat Support | 4 |
| AOR-4 | Replenishment Oiler | 7 |
| <u>MLSF Shuttle Ships</u> | | |
| AFS-3 | Combat Stores | 7 |
| AF-58 | Stores | 1 |
| AE-28 | Ammunition | 13 |
| AO-177 | Fleet Oiler | 16 (Note 1) |
| <u>Major Support Ships (Repair)</u> | | |
| AR-6 | Heavy Repair | 4 |
| AS-36 | Submarine Tender | 12 |
| AD-37 | Destroyer Tender | 9 |
| <u>Minor Support Ships (Salvage/Rescue)</u> | | |
| ARS-41 | Salvage Ship | 6 |
| ASR-22 | Salvage and Rescue | 6 |
| ATF-166 | Towing | 7 (Note 1) |
| ATS-1 | Towing and Salvage | 3 |
| | | <hr/> 95 |

NOTE 1: These are hull numbers of replacement ships under procurement to be representative of the type.

II. MOBILE LOGISTIC SUPPORT FORCE (MLSF) AND CIVILIAN MANNING

A. DEVELOPMENT OF THE MOBILE LOGISTIC SUPPORT FORCE (MLSF)

The vital strategic and tactical importance of forward mobile base support and underway replenishment from fleet support ships became apparent during the early years of WW II. The tactical flexibility that was achieved, due to the availability of a small force of fleet oilers capable of refueling carriers and their escorts, was a key factor in the Navy's victorious conduct of the Battle of Midway in June 1942.

As the benefits of underway replenishment of oil (UNREP) to combatant forces became apparent, operational and logistics planners sought new methods of obtaining total logistic support at sea. In 1943, a Logistics Division was introduced into the CNO organization to provide direction and input to the development of the logistic capability that was to prove vitally important to the Navy's achievement of total victory over the Japanese Fleet. The organization of the Pacific Fleet Service Force provided "squadrons" of ships stationed in secured anchorages to conduct fleet re-supply. These squadrons were geographically oriented and did not follow the movements of the fleet.

By 1944 the tempo of operations had reached the point where fleet units were no longer able to retire to

port for general rehabilitation. The requirement to sustain the fighting forces at sea was met in 1944, through the organization of Service Squadron Six as the Navy's first "Logistic Support Group". From March 1945 until the end of the Pacific War, the bulk of the fleet remained at sea for months at a time and subsisted wholly on UNREP support.

1. The Multi-Product UNREP Ship

During the early use of the logistic support groups to replenish fast carrier task groups in the latter days of World War II, it became increasingly clear to both the commanders of the combatants and the support ships that replenishment time had to be reduced. The combat ships were required to maneuver alongside as many as three separate ships (oiler, munitions, and stores) in order to obtain their replenishment requirements. This resulted in long and sometimes hazardous operations during adverse sea and weather conditions, and in the presence of threatening enemy forces. Such time-consuming operations fostered a desire for a "one-stop" type of operation. A multi-product ship that could provide fuels, munitions, and stores appeared to be the solution.

During the fifties the Atlantic and Pacific Fleet Service Force Commanders assisted the Navy's Ship Characteristic Board in establishing several new classes of multi-product replenishment ships by specifying a design of a Fast Combat Stores Ship (AOE) and a second type of ship

designated as a Combat Stores Ship (AFS). Both ship types were included in the 1961 shipbuilding program and a third type, the AOR Replenishment Fleet Oiler was included in the following year.

The AOE is a combination oiler and ammunition ship with additional space to carry limited (approximately one-half AFS load) quantities of stores and provisions. The AFS combined the functions of the former Stores Ship, General Stores Issue Ship, and Aviation Supply Ship. Both the AOE and the AFS were also fitted with facilities to hangar and operate three helicopters for vertical replenishment (VERTREP). The Replenishment Fleet Oiler (AOR), in addition to possessing the features of a large fleet oiler is provided with limited (approximately one-third AE load) ammunition storage capacity and small quantities of dry and refrigerated stores.

2. Modern MLSF Ships

With the introduction of multi-product ships, higher speeds (20 knots minimum) were specified for all newly designed fleet logistic support ships. The new ships have helicopter flight deck facilities for vertical replenishment. Some are equipped with helicopter hangers. A number of other noteworthy features are incorporated in all dry cargo and ammunition ships built since 1955. These functions included through-decks to facilitate horizontal movement of cargo to any transfer station by using fork lift

trucks, vertical movement of cargo by elevators, inter-ship movement by high-capacity cargo transfer rigs, and automated inventory control. The ships and their cargo handling stations are fitted with lighting to facilitate replenishment at night.

While these ship modifications resulted in significant logistic product handling improvement, the gains were achieved at a high cost of capital investment and increased complexity in the ship and its equipment. The new auxiliaries were designed specifically as fleet logistic support ships, and the former practice of using converted merchant ships discontinued. Hull designs and outfitting equipment increased the procurement costs of single-product (AE) logistic support ships. Modern multi-product ship construction costs now exceed \$200 million per ship. Modern shipboard logistic support systems require higher manning levels of trained personnel, which further adds to their operating costs. Fleet logistics ships have become as valuable and as important as the ships that they service.

3. One Stop Replenishment

The one-stop replenishment concept was tested in the U.S. Navy's participation in the Vietnam War, and it proved to be a sound concept. Table II-1 shows the characteristics of the underway replenishment ships currently employed by the Navy.

TABLE II-1. CHARACTERISTICS OF CURRENT US NAVY FLEET UNDERWAY REPLENISHMENT SHIPS

| TYPE & CLASS | NO. | DISPL. | SPD. | AGE | UNDERWAY REPLENISHMENT CAPABILITY | | | |
|----------------------------------------------|-----|--------|------|-------|-----------------------------------|---------------------|------|---------|
| | | | | | FUELS | PROVISIONS & STORES | AMMO | VERTREP |
| AOE - Fast Combat Support Ship SACRAMENTO | 4 | 53,600 | 26 | 9-14 | X | X | X | X |
| AOR - Replenishment Oiler WICHITA | 7 | 38,000 | 20 | 4-9 | X | Ltd. | Ltd. | X |
| AFS - Combat Store Ship MARS | 7 | 16,500 | 20 | 9-14 | | X | | X |
| AE - Ammunition Ship KILAUEA | 8 | 20,500 | 20 | 4-9 | | | X | X |
| | 5 | 17,500 | 21 | 19-24 | | | X | X |
| TAF - Stores Ship RIGEL | 1 | 15,500 | 20 | 22 | | X | | X |
| AO - Fleet Oiler NEOSHO | 6 | 40,000 | 20 | 24 | X | | | |
| AO - Fleet Oiler MISPILLION | 5 | 34,750 | 16 | 30-up | X | | | |

B. MILITARY SEALIFT COMMAND (MSC)

The Military Sealift Command is a Navy command, with fleet status, and is one of three Transportation Operating Agencies (TOAs) established by direction of the Department of Defense. The Secretary of the Navy is the Single Manager for Ocean Transportation within the Department of Defense and MSC is the operating agency.

The MSC mission is to provide strategic mobility assets and services in support of the Army, Navy, Marine Corps, and Air Force in war and emergency or contingency. It also is responsible for the development of assets, systems and services to fulfill its missions. The mission areas include the transport of Department of Defense dry cargo and petroleum products worldwide, and the operation of ships involved in non-transportation missions, such as oceanographic and hydrographic research, cable laying and repair, support of the nation's space flight program support of Air Force missile test centers, and similar programs.

Since 1972, MSC has been given the added responsibility for the manning, operation and maintenance of selected ships which operate as part of the Navy Mobile Logistic Support force, and now operates a total of 17 such ships, including four ocean going fleet tugs, a stores ship, eight fleet oilers, and four fleet ballistic missile resupply ships.

Inherent in the MSC charter is a requirement to provide effective, efficient and economical transportation to the military services which it supports--and which reimburses the command for services rendered via payment at Department of Defense established tariff rates through the Navy Industrial Fund. MSC's objective is to break even, with the cost of its services and overhead expenses being reimbursed by those organizations who are provided a service by MSC ships.

The Military Sealift Command employs Navy Civil Service seagoing personnel aboard selected government-owned and operated ships. At the direction of DOD, MSC also contracts with the private maritime industry for the operation of a part of its fleet. The MSC seagoing manpower level is established by the number of crewmen assigned to its operating ships plus 22% supernumeraries. The supernumeraries are assigned to the Replacement/Reserve Pool for reassignment, leave, temporary hospitalization and training.

Most Navy Civil Service seamen enter MSC service from the private seagoing maritime industry. Most maintain their union affiliation, although union membership is not required by MSC. The Military Sealift Command also recruits non-union seamen. Many of these personnel are retired or discharged Navy veterans who qualify for and obtain a U.S. Coast Guard license or certificate.

U.S. Government agencies honor employer/union agreements when they enter into contracts with the private business sector. The Military Sealift Command is guided by this order and has contracts with all merchant marine unions. MSC pays its seamen union wage scales instead of Civil Service salaries. MSC also honors union habitability standards insofar as possible. MSC does not abide by union contract manning and seamen rotation policies, nor does it contribute money to union pension funds or to workforce training programs. Unions represent Navy Civil Service seamen in all areas permitted under Executive Order 11491, as amended.

C. THE U.S. MERCHANT MARINE

In 1936, the Congress passed the Merchant Marine Act, which states that a strong merchant marine is needed to provide for national security. This legislation requires that the specifications and plans of ships built under a subsidy program authorized by the Act be reviewed by the Navy Department to insure "...that such vessel shall be suitable for economical and speedy conversion into a naval or military auxiliary, or otherwise suitable for the use of the United States Government in time of war or national emergency." 1/

1/The Merchant Marine Act of 1936, 46 U.S. Code, Sec. 501(b), (1936)

Private ship owners operate their ships in seaborne commerce to earn profits. Ship performance, i.e., productivity, operating, manning and maintenance costs are some of the factors that determine profitability and subsequently influence ship design and shipboard manning levels. (Competition and technological improvements are also significant factors.)

Merchant ships are constructed to standards prescribed by government regulatory agencies and societies of shipbuilding specialists for vessel certification. The purpose of certification is to ensure that a vessel is seaworthy. In a merchant ship, seaworthiness is the capability to survive hull damage, fire, engineering breakdowns and grounding resulting from improper operation of the ship. A merchant ship's crew provides those services essential to effective performance of the point to point operation. Their function is to safely operate and maintain the ship in compliance with the owner's orders. In order to minimize personnel costs, ship owners establish manning at the lowest permissible level required by certification, government regulations, union manning agreements and safety considerations. In this regard, the current trend in ship design and operation is to stress manpower saving through automation which is found through analysis to be cost effective.

In the past, merchant ships carrying cargos between ports were designed to be "self-sustaining", that is, capable of discharging and loading cargos without the assistance of shore-based equipment. However, the rapid expansion and modernization of port facilities and cargo handling equipment throughout the world, and such concepts as containerization have made it both unnecessary and, more importantly, uneconomical to provide ships with a self-sustaining capability. Commercial ships are crewed to operate, maintain and navigate them between ports. No personnel are carried aboard to discharge cargo.

Consequently, modern ships of the types engaged in commercial trade have neither the facilities nor personnel required to transfer large volumes of cargo in short periods of time to other ships while underway. On the other hand, Navy fleet oilers and stores ships are capable of conducting at sea cargo transfers using their underway replenishment shipboard transfer system. The modus operandi accounts for the differences in design crew size and productivity between Navy fleet support ships and merchant ships.

D. CONCEPT OF CIVILIAN MANNING

1. Development of the Concept

In 1970 the Chief of Naval Operations and the Assistant Secretary of Commerce for Maritime Affairs sponsored a joint study conducted under the direction of the Center for Naval Analysis to examine alternate methods of

providing support to the fleet by use of merchant ships.^{1/}

The study concluded that there were potential cost and manpower savings in using suitably configured merchant ships in place of, or in addition to, fleet logistic support ships. It proposed that a series of tests be conducted to examine the feasibility of utilizing civilian manned merchant ships in naval support force roles. Among the more significant concepts recommended for test at sea were the refueling of warships from a commercial tanker, and the transfer of ammunition to warships from a commercial self-sustaining break-bulk cargo ship.

2. Charger Log

The Charger Log Program (Table II-2) was the U.S. Navy's response to the CNO/MARAD study recommendations. The Charger Log program tested the concept of utilizing civilian manned ships for fleet logistic support. The Charger Log I test demonstrated that a commercial tanker (SS ERNA ELIZABETH) fitted with refueling hose attachment points and an astern refueling hose could refuel aircraft carriers, and other major warships, destroyers, and naval auxiliary ships in an emergency. Though test results demonstrated that a merchant tanker fitted with National Defense Features (NDF) could refuel naval vessels in an

^{1/}Center for Naval Analysis, Arlington, VA, Study 33, "The Role of Merchant Ships in Wartime Defense Missions", July 1972.

TABLE II-2. CHARGER LOG PROGRAM

| SERIES | DESCRIPTION | RESULTS/STATUS |
|--------|----------------------------------------------------------------|---------------------------------------------------------------------------------------------|
| I | OPPORTUNE UNREP FROM MERCHANT TANKER | ONE TIME DEMONSTRATION COMPLETED. COMMERCIAL CONTRACT CREW. |
| II | FULL TASK GROUP SUPPORT FROM DEDICATED MSC FLEET OILER | ON GOING. EIGHT (8) TAOs IN FLEET SUPPORT SERVICE. NAVY CIVIL SERVICE CREWS. |
| III | NAVY/MSC COMPARABLE MANNING COMPETITION | CANCELLED |
| IV | OPPORTUNE WORLDWIDE FLEET UNREPS FROM MSC CHARTERED TANKERS | ON GOING. COMMERCIAL CONTRACT CREWS. |
| V | CIVILIAN MANNING NAVY SUPPORT SHIPS | ON GOING. EIGHT (8) TAOs, ONE (1) TAF, FOUR (4) TATFs IN SERVICE. NAVY CIVIL SERVICE CREWS. |
| VI | OPPORTUNE AT-ANCHOR UNREP FROM MERCHANT TANKERS (INDIAN OCEAN) | DEMONSTRATION COMPLETED, AVAILABLE SERVICE. COMMERCIAL CONTRACT CREWS. |
| VII | OPPORTUNE LASH VERTREP/BARGE REPLENISHMENT (SIXTH FLEET) | SUCCESSFUL DEMONSTRATION COMMERCIAL CONTRACT CREW. |

emergency, the test brought to light the inadequacies of such vessels if used routinely, i.e.,

- Product delivery was limited by the Master's assessment of the impact of hull stresses (Hog and Sag) in heavy seas.

- Astern refueling rates were low.

- Small crew (39) limited rig handling to one station at a time.

- Low freeboard hindered rigging and unrigging of hoses because of interference from boarding seas in heavy weather.

- Communications were hampered because merchant tankers do not have the secure communications capability needed under some emergency or wartime conditions.

Charger Log II further implemented the CNO/MARAD Study recommendation to conduct tests involving the use of civilian seamen aboard an ex-U.S.S. fleet oiler. This test resulted in additional fleet oilers manned by Navy Civil Service mariners. Charger Log V furthered the objectives of the CNO/MARAD Study with the test and transfer of a Fleet Stores Ship (AF), 4 Fleet Tugs (ATFs) and 2 Cable Layers (ARCs) to MSC for Navy Civil Service manning.

E. NAVY MANNING POLICIES

The U.S. Navy is dedicated to the national defense. Its warships are designed and built to inflict loss or maximum damage upon enemy forces during an encounter, while

sustaining minimum losses to personnel and damages to themselves.

Naval ships are constructed with hull systems that are designed to resist disabling fire and flooding damage. Propulsion and weapon systems have built-in redundancy to prevent a complete loss of military capabilities as a result of enemy action or system failures. Command, control and communications systems are installed to ensure that ships can operate as an integrated and responsive unit.

The manning level on naval ships is largely determined by these complex systems, the requirement for redundancy, and battle and cruising conditions.

In order to minimize risks which would immobilize a ship as a result of battle damage, weather damage, grounding, collision or machinery casualties, personnel are allocated to watch stations to exercise immediate casualty control. Additional personnel are assigned to Navy ships for shipboard on-the-job training.

III. MANPOWER REQUIREMENTS ANALYSIS

A. BASELINE FOR MANPOWER REQUIREMENTS

The first step in the study was to determine the number and skill requirements of civilian personnel needed to perform the functions which are performed by Navy officer and enlisted men on the ships being studied. Shipboard functions were categorized as either Deck, Engine, Steward, Purser, Medical, Communications and Repair departments to allow comparisons among Navy Military, Navy Civil Service, and Commercial Contract manpower. These functional areas are those divisions in responsibilities found aboard MSC and commercially operated ships. Table III-1 is a sample of the manpower analysis to be found in Appendix A, Volume III.

The Navy military manning analysis is based on the organizational requirements developed by the Ship Manning Documents. The highest condition of manning readiness for Navy military manned ships is Condition I (Battle). The Civil Service and Commercial Contract manning is based on estimates provided by COMSC and MARAD, respectively. The highest condition of manning readiness for both Navy Civil Service and Commercial Contract manning of fleet support ships is roughly equivalent to Navy Readiness Condition III (Cruising). However, many functions performed by naval military personnel related to management, operations, and administration are either reduced or eliminated aboard ships crewed with civilian seamen.

TABLE III-1

MANPOWER REQUIREMENTS SUMMARY

(NAVY MILITARY MANNING)

TYPE SHIP: Stores

REPRESENTATIVE SHIP STUDIED: AF-58

NUMBER OF SHIPS IN FLEET 1

| DIVISION | MANPOWER REQUIREMENTS | | | | TOTAL MANPOWER REQUIREMENTS | | | |
|----------------|-----------------------|------------------|----------|------------------|-----------------------------|------------------|----------|------------|
| | OFFICERS | WARRANT OFFICERS | ENLISTED | TOTAL ALL GRADES | OFFICERS | WARRANT OFFICERS | ENLISTED | ALL GRADES |
| DECK | 6 | 0 | 109 | 115 | 6 | 0 | 109 | 115 |
| ENGINE | 2 | 2 | 76 | 80 | 2 | 2 | 76 | 80 |
| STEWARD | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| PURSER | 2 | 1 | 43 | 46 | 2 | 1 | 43 | 46 |
| MEDICAL | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| COMMUNICATIONS | 1 | 0 | 8 | 9 | 1 | 0 | 8 | 9 |
| REPAIR | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| ALL DIVISIONS | 11 | 3 | 236 | 250 | 11 | 3 | 236 | 250 |

B. CIVILIAN MANNING ALTERNATIVES

The manpower requirement estimates for Navy Civil Service manning of the fleet support ships were obtained from the Military Sealift Command (MSC). MSC's estimates of manning requirements are based on their functional analysis of the tasks required to ensure mission performance and ship maintenance. Table III-2 and III-3 are samples of the detailed data to be found in Appendix A of Volume III. They include both the Civil Service personnel and the military detachments required for ship operation. These military detachments will carry out essential functions which are either considered to be inappropriate for accomplishment by Civil Service personnel, or which cost substantially less on a one for one basis when accomplished by military personnel.

The manpower requirements estimates for Commercial Contract manning of the ships under study were obtained from the U.S. Maritime Administration (MARAD). These estimates are based on MARAD's functional analysis of the tasks required to accomplish assigned missions and to perform ship maintenance. For the Commercial Contract manning case, the size and structure of required Navy military detachments was developed by the Study Team using the same specification as that which was applied to the Navy Civil Service manning alternative.

TABLE III-2

MANPOWER REQUIREMENTS SUMMARY
(NAVY CIVIL SERVICE PERSONNEL)

TYPE SHIP STORES

REPRESENTATIVE SHIP STUDIED TAF-58

NUMBER OF SHIPS IN FLEET

1

| DEPARTMENT | MANPOWER REQUIREMENTS | | | TOTAL MANPOWER REQUIREMENTS | | |
|------------|-----------------------|------------|-------|-----------------------------|------------|-------|
| | LICENSED | UNLICENSED | TOTAL | LICENSED | UNLICENSED | TOTAL |
| DECK | 6 | 46 | 52 | 6 | 46 | 52 |
| ENGINE | 6 | 29 | 35 | 6 | 29 | 35 |
| STEWARD | 0 | 23 | 23 | 0 | 23 | 23 |
| PURSER | 0 | 2 | 2 | 0 | 2 | 2 |
| MEDICAL | 0 | 1 | 1 | 0 | 1 | 1 |
| ALL | 12 | 101 | 113 | 12 | 101 | 113 |

TABLE III-3

MANPOWER REQUIREMENTS SUMMARY
(MILITARY DETACHMENT--NAVY CIVIL SERVICE MANNING)

TYPE SHIP COMBAT STORESREPRESENTATIVE SHIP STUDIED AFS-5NUMBER OF SHIPS IN FLEET 7

| FUNCTION | MANPOWER REQUIREMENTS | | | | TOTAL MANPOWER REQUIREMENTS | | | |
|------------------------------|-----------------------|------------------|----------|------------------|-----------------------------|------------------|----------|------------------|
| | OFFICERS | WARRANT OFFICERS | ENLISTED | TOTAL ALL GRADES | OFFICERS | WARRANT OFFICERS | ENLISTED | TOTAL ALL GRADES |
| OPERATIONS | 1 | 0 | 1 | 2 | 7 | 0 | 7 | 14 |
| ADMINISTRATION | 0 | 0 | 1 | 1 | 0 | 0 | 7 | 7 |
| COMMUNICATIONS | 0 | 0 | 24 | 24 | 0 | 0 | 168 | 168 |
| SUPPLY * | 0 | 0 | 15 | 15 | 0 | 0 | 105 | 105 |
| MEDICAL/DENTAL | | | | | | | | |
| GUARD | | | | | | | | |
| (EXPLOSIVE ORD. DISPOSAL) | | | | | | | | |
| STEWARD | | | | | | | | |
| (COMBAT INF. CENTER) | 0 | 0 | 3 | 3 | 0 | 0 | 21 | 21 |
| SALVAGE/RESCUE | | | | | | | | |
| ALL | 1 | 0 | 44 | 45 | 7 | 0 | 308 | 315 |

* First year of operation only

C. SUMMARY OF MANPOWER REQUIREMENTS

Table III-4 compares the total manpower requirements for the operation of each of the ships under study for each of the manning alternatives. It will be noted that military manpower requirements are significantly greater (19% to 70%) than those of either of the civilian manning alternatives. These differences are partly explained by the deletion of certain military functions under the civilian manning alternatives. One major difference is due to the fact that a portion of the military crew is composed of naval military personnel who are undesignated trainees. These junior personnel often represent 40% of the total enlisted crew on auxiliary ships.

The Navy Civil Service and Commercial Contract manning alternatives require comparable manning levels, and theoretically should be identical. Reduction of manning is achieved by maximum use of automated features where installed, fewer watch and administrative personnel and through extensive cross-training of most personnel for UNREP operations.

Details of the ship by ship analysis and manpower distribution may be found in Appendix A of Volume III.

TABLE III-4
MANPOWER REQUIREMENTS COMPARISON--
SUPPORT FLEET MANNING ALTERNATIVES

| SHIP TYPE | NAVY MILITARY MANNING | NAVY CIVIL SERVICE MANNING | | CONTRACT PERSONNEL | COMMERCIAL CONTRACT MANNING | |
|--------------|--------------------------|-------------------------------|------------------------|-----------------------|--------------------------------|-------------------|
| | | CIVIL SERVICE | MILITARY DETACHMENT | | MILITARY DETACHMENT | TOTAL |
| AF | 250 | 113 | 18 | 96 | 27 | 123 |
| AFS | 447 | 125 | 45 ^{1/} | 148 | 55 ^{2/} | 203 ^{2/} |
| AOR | 418 | 115 | 29 | 144 | 32 | 176 |
| AOE | 568 | 159 | 40 | 175 | 49 | 224 |
| AE | 382 | 121 | 27 | 117 | 41 | 158 |
| AO | 183 | 89 | 19 | 84 | 19 | 103 |
| AD | 1,175 | 147 | 706 | 118 | 706 | 824 |
| AS | 1,145 | 147 | 784 | 118 | 784 | 902 |
| AR | 693 | 147 | 364 | 130 | 364 | 494 |
| ARS | 104 | 28 | 6 | 24 | 8 | 32 |
| ASR | 209 | 59 | 29 | 44 | 28 | 72 |
| ATF | 47 | 16 | 4 | 25 | 10 | 35 |
| ATS | 134 | 28 | 14 | 25 | 15 | 40 |

^{1/}This is the number of personnel in the Military Detachment during the first operating year only for purposes of training commercial contract personnel in ship logistic cargo management. In all subsequent years the Military Detachment consists of 30 personnel, and total personnel equals 155.

^{2/}This is the number of personnel in the Military Detachment during the first year of operation. In all subsequent years the Military Detachment consists of 39 personnel, and total personnel equals 187

NOTE: Navy Civil Service and Commercial Contract Manning provides fewer manned UNREP stations than Navy Military Manning. Also neither Combat Information Center nor Weapons are manned.

IV. COST ANALYSIS

A. INTRODUCTION

A comprehensive cost analysis was conducted for each of three alternative manning policies: Navy Military, Navy Civil Service, and Commercial Contract. Both a Five Year Defense Plan (FYDP) profile and thirty year life cycle economic projections were developed.

The FYDP cost analysis considered all significant cost elements except new ship construction, addressed each of thirteen type of ships, and was conducted in escalated current year dollars. The economic study omitted all cost elements which did not vary with the manning alternative. These were the Ship Construction, Navy (SCN) cost per ship, the Base Operating Support (BOS) (O&MN) cost per ship year and the Fleet Modernization Plan (FMP) installation cost per ship. Included were 108 ship hulls and their applicable replacements over a 30 year period. The analysis was performed in constant 1977 fiscal year dollars. The economic cost to the U.S. Government and to the Department of Defense was estimated and both estimates were generated in discounted and undiscounted dollars using a 10% discount rate. In addition, a cost per deployed day was computed.

The requisite operating cost data for the selected ship or ship types was extracted from the July 1976 Navy Program Factors Manual^{1/} to represent the specific class.

^{1/}OPNAV-90P-02, Navy Program Factors Manual, Department of the Navy, July 1976

Details of the manpower cost analysis are provided in Appendix A, Volume III, and the total cost analyses are shown in Appendix B, Volume III.

Because manpower costs is one of the driving variables of the civilian manning concept, it was broken out separately in this study.

B. ANNUAL FYDP MANPOWER COST

The Five Year Defense Plan (FYDP) cost analysis applies all the wage and associated reimbursements involved in maintaining a man on duty for the manning requirements developed in Section III.

1. Navy Military Manning Manpower Cost

The Composite Standard Military Rates have been used to represent the manpower FYDP costs associated with the various military pay grades. Rates effective 1 Oct 76 were extracted from NAVCOMPTNOTE 7041 (Oct 76), and used in accordance with POM-79-15.1/ The Composite Standard Rate is described fully in Section X, NAVCOMPT Manual, Volume 3. The following costs are included in the rate structure:

| | |
|-----------------------------|-----------------------|
| Base Pay | BAQ |
| FICA (employer share) | Sea Pay |
| Re-enlistment Bonuses | Foreign Duty Pay |
| Settlement Costs | Clothing Allowance |
| Proficiency Pay | Subsistence Allowance |
| Hazardous Duty Pay | Death Gratuity |
| Family Separation Allowance | Life Insurance |
| Separation Payments | |

1/Office of the Chief of Naval Operations, Memorandum No. POM 79-15, Dept. of the Navy, dated 6 January 1977.

The resulting cost by pay grade is shown on Table A-5, Appendix A, Volume III, and the methodology utilized to compute the annual manpower FYDP cost for the Navy military manning case is also described in that Appendix. The results of the annual manpower FYDP cost computations are shown by ship and ship department in Tables A-68 through A-80, Appendix A, Volume III, and are summarized in Table IV-1 of this chapter.

2. Navy Civil Service Manning Manpower Cost

Computation of Navy Civil Service personnel FYDP costs are based on the following cost data inputs provided by MSC:

| | |
|--------------------------|---------------------------------------------------------------------------------------------|
| Base Pay | Ammunition Differential Pay |
| Overtime Pay | Travel |
| Premium/Penalty Pay | Annual Sick and Military Leave |
| Subsistence | Insurance (Medical and Life) |
| Retirement ^{1/} | Shore Leave |
| Ammunition Handling | Other (Relief Officers, Awaiting Assignment, Training, Damage Control Instruction) |

This cost data was provided in fiscal year 76 dollars and was escalated to fiscal year 77 dollars prior to the computation of Civil Service manpower costs to allow comparison with Navy military manning costs.^{2/} A detailed description of these computations is provided in Appendix A, Volume III. The results of these computations are shown in

^{1/}Computed as seven percent of Base Pay

^{2/}An escalation factors of 1.05 was provided by COMSC for this purpose

TABLE IV-1

ANNUAL MANPOWER FYDP COST COMPARISON--
SUPPORT FLEET MANNING ALTERNATIVES
(Thousands of FY 77 Dollars)

| SHIP TYPE | NAVY MILITARY MANNING | NAVY CIVIL SERVICE MANNING | | COMMERCIAL CONTRACT MANNING | | |
|--------------|--------------------------|-------------------------------|------------------------|--------------------------------|------------------------|--------|
| | | CIVIL SERVICE | MILITARY DETACHMENT | CONTRACT PERSONNEL | MILITARY DETACHMENT | TOTAL |
| AF | 2,409 | 2,674 | 192 | 3,091 | 297 | 3,388 |
| AFS | 4,282 | 3,198 | 492 | 4,566 | 596 | 5,162 |
| AOR | 3,960 | 3,054 | 303 | 5,043 | 353 | 5,396 |
| AOE | 5,305 | 4,371 | 431 | 5,958 | 539 | 6,497 |
| AE | 3,594 | 2,960 | 318 | 3,557 | 455 | 4,012 |
| AO | 1,837 | 2,362 | 215 | 2,983 | 209 | 3,192 |
| AD | 11,446 | 3,021 | 7,158 | 3,613 | 7,158 | 10,771 |
| AS | 11,879 | 3,021 | 8,404 | 3,613 | 8,404 | 12,017 |
| AR | 6,808 | 2,979 | 3,412 | 3,963 | 3,412 | 7,375 |
| ARS | 1,049 | 810 | 67 | 961 | 86 | 1,047 |
| ASR | 2,056 | 1,534 | 306 | 1,662 | 353 | 2,015 |
| ATF | 497 | 536 | 42 | 1,012 | 106 | 1,118 |
| ATS | 1,317 | 850 | 155 | 1,019 | 174 | 1,193 |

1/ This is the Military Detachment cost for the first operating year only for purposes of training commercial contract personnel in ship logistic cargo management. The Military Detachment cost for all subsequent years is \$316,000, resulting in a total annual cost of \$3,514,000.

2/ This is the Military Detachment cost for the first operating year only due to increased personnel for training of commercial contract personnel in ship logistic cargo management. The Military Detachment cost for all subsequent years is \$425,000 resulting in a total annual cost of \$4,991,000.

NOTE: Navy Civil Service and Commercial Contract Manning provides fewer manned UNREP stations than Navy Military Manning. Also, neither Combat Information Center nor Weapons are manned.

Tables A-81 through A-93, Appendix A, Volume III, and are summarized in Table IV-1 of this chapter.

The FYDP costs of Navy military detachment personnel was computed in the same manner used in the Navy military manning FYDP cost analysis previously described and is shown in Appendix A, Volume III, Tables A-94 through A-106, and summarized in Table IV-1 in this Volume.

3. Commercial Contract Manning Manpower Cost

These FYDP costs were computed by MARAD for direct input into this study. Cost elements included in the MARAD calculations are:

| | |
|-------------------------|-----------------------------|
| Penalty Pay | Travel |
| Base Wage | Pension Contribution During |
| Non-Watch Differential | Paid Vacation |
| Vacations | Training |
| Pension Funds | Ammunition Differential |
| Welfare/Medical | Ammunition Handling |
| Automation Differential | Overtime |
| Hiring Costs | |

The FYDP costs computed by MARAD for commercial contract personnel are shown in Appendix A, Volume III, Tables A-108 through A-120 and are summarized in Table V-1 of this section. Manpower FYDP cost of Navy military detachment personnel was computed in the same manner as the Navy military FYDP cost analysis, and is displayed in detail in Appendix A, Volume III, Tables A-121-A-133, and summarized in Table IV-1 of this section.

4. Cost per Man

As an interesting sidelight the average annual

FYDP cost per man was computed and is shown in comparison format in Table IV-2.

C. MANPOWER ECONOMIC COST ANALYSIS

1. Navy Military Manning Manpower Cost

Navy military manpower economic costs were computed based on the Navy Billet Cost Model (NBCM).^{1/} This model estimates the annualized life cycle cost incurred by DOD for the manning of an established or proposed billet aboard a ship. NBCM cost inputs include the following:

| | |
|--------------------------------------|-----------------------|
| Base Pay | Clothing Allowance |
| FICA (Employer's Share) | Mess Cost |
| Recruiting Costs | Commissary/Exchange |
| Training Costs (Incl. Support) | Subsistence Allowance |
| Retirement Contribution | Death Gratuity |
| Reenlistment Bonuses/Settlement Cost | Medical Cost |
| Proficiency Pay | Accession Travel |
| Hazardous Duty Pay | Training Travel |
| Family Separation Allowance | Change of Station |
| Separation Payments | Separation (Travel) |
| Serviceman's Life Insurance | BAQ |
| Tuition Assistance | Sea Pay |
| Dependent's Schools | Foreign Duty Pay |

In accordance with POM 79-15, billet costs effective 1 October 1976 have been used.

While the NBCM cited computes the cost of each billet relative to pay grade and occupational specialty (Navy Enlisted Code), the mean billet cost for each pay grade was determined and used in the calculation of the economic cost of manpower. The mean billet costs used are shown in Table IV-3. The decision to use the mean billet

^{1/}Navy Military Manpower Billet Cost Data for Life Cycle Planning Purposes. A print-out published an updated annually by the Bureau of Naval Personnel.

TABLE IV-2

AVERAGE ANNUAL FYDP COST PER MAN COMPARISON--
FLEET SUPPORT MANNING ALTERNATIVES^{1/}

| SHIP | NAVY MILITARY MANNED | NAVY CIVIL SERVICE MANNING | | | COMMERCIAL CONTRACT MANNING | | |
|------|-------------------------|-------------------------------|------------------------|------------------|--------------------------------|------------------------|------------------|
| | | CIVIL SERVICE | MILITARY DETACHMENT | ALL PERSONNEL | CONTRACT PERSONNEL | MILITARY DETACHMENT | ALL PERSONNEL |
| AF | 9,636 | 23,664 | 10,667 | 21,878 | 31,541 | 11,000 | 27,104 |
| AFS | 9,579 | 25,584 | 10,933 | 21,706 | 30,851 | 10,836 | 25,429 |
| AOR | 9,474 | 26,557 | 10,448 | 23,313 | 35,021 | 11,031 | 30,659 |
| AOE | 9,430 | 27,491 | 10,775 | 24,131 | 34,046 | 11,000 | 29,004 |
| AE | 9,408 | 24,463 | 11,778 | 22,149 | 30,402 | 11,098 | 25,392 |
| A0 | 10,038 | 26,539 | 11,316 | 23,861 | 35,512 | 11,000 | 30,990 |
| AD | 9,741 | 20,551 | 10,139 | 11,933 | 30,619 | 10,139 | 13,072 |
| AS | 10,375 | 20,551 | 10,719 | 12,272 | 30,619 | 10,719 | 13,323 |
| AR | 9,824 | 20,265 | 9,374 | 12,507 | 30,485 | 9,374 | 14,929 |
| ARS | 10,087 | 28,929 | 11,167 | 25,794 | 40,042 | 10,750 | 32,719 |
| ASR | 9,837 | 26,000 | 10,552 | 20,909 | 37,773 | 12,607 | 27,986 |
| ATF | 10,574 | 33,500 | 10,500 | 28,900 | 40,480 | 10,600 | 31,943 |
| ATS | 9,828 | 30,357 | 11,071 | 23,929 | 40,760 | 11,600 | 29,825 |

^{1/} All costs are shown in FY 77 dollars.

TABLE IV-3

MANPOWER ECONOMIC COSTS BY PAY GRADE^{1/}

| <u>PAY GRADE</u> | <u>MEAN BILLET COST</u> |
|------------------|-----------------------------|
| O-6 | \$72,714 |
| O-5 | 50,598 |
| O-4 | 40,752 |
| O-3 | 35,394 |
| O-2 | 30,382 |
| O-1 | 22,316 |
| W-4 | 40,778 |
| W-3 | 33,311 |
| W-2 | 28,488 |
| W-1 | 24,977 |
| E-9 | 26,704 |
| E-8 | 24,121 |
| E-7 | 21,611 |
| E-6 | 18,258 |
| E-5 | 14,538 |
| E-4 | 12,043 |
| E-3 | 10,582 |
| E-2 | 9,898 |

¹ These costs are effective as of 1 Oct 76

cost was made in order to simplify computations (there are 736 individual billet costs computed for enlisted personnel alone). The sensitivity test conducted to determine the appropriateness of this decision is shown in Appendix A, Volume III, page A-99, as part of a detailed description of the methodology used for the computation of the total annual manpower economic costs for this manning alternative. The results of these computations are shown in Table A-68 through A-80 of Appendix A, Volume III, and are summarized in Table IV-4 of this section.

2. Navy Civil Service Manning Manpower Cost

The methodology used to compute the annual economic cost of Navy Civil Service personnel is similar to that described above for the computation of the manpower FYDP cost of these personnel, except that retirement is computed at a rate of 14.1%^{1/} of base pay instead of 7%. The methodology used to compute the economic cost of Navy military detachment personnel is the same as that used for the Navy military manning alternative (see paragraph IV-C-1 above).

The results of these cost computations are detailed in Tables A-81 through A-93 of Appendix A, Volume III, and are summarized in Table IV-4 of this Section. The

^{1/}The rate was increased to 20.4% by new OMB guidelines too late to be incorporated in the cost analysis.

TABLE IV-4

ANNUAL MANPOWER UNDISCOUNTED ECONOMIC COST COMPARISON
FLEET SUPPORT MANNING ALTERNATIVES
(Thousands of FY 77 Dollars)

| SHIP TYPE | NAVY MILITARY MANNING | NAVY CIVIL SERVICE MANNING | | COMMERCIAL CONTRACT MANNING | |
|--------------|--------------------------|-------------------------------|------------------------|--------------------------------|------------------------|
| | | CIVIL SERVICE | MILITARY DETACHMENT | CONTRACT PERSONNEL | MILITARY DETACHMENT |
| | TOTAL | | | TOTAL | TOTAL |
| AF | 3,471 | 2,762 | 279 1/2 | 3,041 1/2 | 3,527 2/3 |
| AFS | 6,185 | 3,306 | 702 1/2 | 4,008 1/2 | 5,433 2/3 |
| AOR | 5,685 | 3,149 | 433 | 3,582 | 5,560 |
| AOE | 7,605 | 4,510 | 625 | 5,135 | 6,751 |
| AE | 5,153 | 3,055 | 462 | 3,517 | 4,228 |
| AO | 2,648 | 2,438 | 309 | 2,747 | 3,289 |
| AD | 16,344 | 3,122 | 10,234 | 13,356 | 13,846 |
| AS | 17,038 | 3,122 | 12,067 | 15,189 | 15,680 |
| AR | 9,772 | 3,078 | 5,124 | 8,202 | 9,087 |
| ARS | 1,514 | 837 | 96 | 933 | 1,084 |
| ASR | 2,963 | 1,585 | 446 | 2,031 | 2,176 |
| ATF | 725 | 553 | 59 | 612 | 1,163 |
| ATS | 1,898 | 878 | 226 | 1,104 | 1,274 |

1/This is the Military Detachment cost for the first operating year only for purposes of training commercial contract personnel in ship logistics cargo management. The Military Detachment cost for all subsequent years is \$451,000, resulting in a total annual cost of \$3,757,000.

2/This is the Military Detachment cost for the first operating year only due to increased personnel for training of commercial contract personnel in ship logistic cargo management. The Military Detachment cost for all subsequent years is \$621,000, resulting in a total annual cost of \$5,187,000.

NOTE: Navy Civil Service and Commercial Contract Manning provides fewer manned UNREP stations than Navy Military Manning. Also, neither Combat Information Center nor Weapons are manned.

detailed military detachment costs are displayed on Table A-94 through A-106, Appendix A, Volume III, and summarized in Table IV-4 of this Section.

3. Commercial Contract Manning Manpower Cost

The annual FYDP cost of commercial contract manpower is the full annual cost of that manpower to the U.S. Government. Therefore, the FYDP and economic costs of manpower for this alternative are the same. The methodology used to compute the economic cost of Navy military detachment personnel is the same as that used for the Navy military manning alternative. The results of these cost computations and the economic cost of commercial contract personnel are shown in Tables A-108 through A-120 of Appendix A, Volume III. The costs of the military detachments required for this option are displayed on Tables A-125 through A-133 of Appendix A, Volume III, and summarized on Table IV-4 of this Section.

4. Average Annual Economic Cost Per Man

The average annual economic cost per man for each of the three manning alternatives is shown in comparison format in Table IV-5.

D. TOTAL FYDP COST

In order to evaluate the feasibility of expanding civilian manning to additional fleet support ships, a comprehensive FYDP cost analysis was conducted for each of the

TABLE IV-5

AVERAGE ANNUAL ECONOMIC COST PER MAN COMPARISON--
SUPPORT FLEET MANNING ALTERNATIVES ^{1/}

| SHIP | NAVY MILITARY MANNED | NAVY CIVIL SERVICE MANNING | | | COMMERCIAL CONTRACT MANNING | | |
|------|-------------------------|-------------------------------|------------------------|------------------|--------------------------------|------------------------|------------------|
| | | CIVIL SERVICE | MILITARY DETACHMENT | ALL PERSONNEL | CONTRACT PERSONNEL | MILITARY DETACHMENT | ALL PERSONNEL |
| AF | 13,884 | 24,442 | 15,500 | 23,214 | 31,541 | 16,148 | 28,216 |
| AFS | 13,837 | 26,448 | 15,600 | 23,576 | 30,851 | 15,764 | 26,764 |
| AOR | 13,600 | 27,383 | 14,931 | 24,875 | 35,021 | 16,156 | 31,591 |
| AOE | 13,389 | 28,365 | 15,625 | 25,804 | 34,046 | 16,184 | 30,138 |
| AE | 13,490 | 25,248 | 17,111 | 23,764 | 30,402 | 16,366 | 26,759 |
| A0 | 14,470 | 27,393 | 16,263 | 25,435 | 35,512 | 16,105 | 31,932 |
| AD | 13,910 | 21,238 | 14,496 | 15,658 | 30,619 | 14,494 | 16,825 |
| AS | 14,880 | 21,238 | 15,392 | 16,315 | 30,619 | 15,392 | 17,384 |
| AR | 14,101 | 20,939 | 14,077 | 16,051 | 30,485 | 14,077 | 18,395 |
| ARS | 14,558 | 29,893 | 16,000 | 27,441 | 40,042 | 15,375 | 33,875 |
| ASR | 14,177 | 26,864 | 15,379 | 23,080 | 37,773 | 18,357 | 30,222 |
| ATF | 15,426 | 34,563 | 14,750 | 30,600 | 40,480 | 15,100 | 33,229 |
| ATS | 14,164 | 31,357 | 16,143 | 26,286 | 40,760 | 17,000 | 31,850 |

^{1/}All costs are shown in FY-77 dollars.

three manning policies. The FYDP cost includes all budget appropriations required for support ship operations from fiscal year 1979 to 1983 inclusive. The study addressed each of 13 types of ships and was conducted in current year dollars as prescribed in the POM 79-15 instruction.

1. Cost Breakdown Structure

In addition to the FYDP manpower costs described in the previous sections, the total FYDP cost includes all other costs incurred in the reconfiguration (where necessary), operation, maintenance, berthing, and support, of the ships under study. New ship construction was specifically excluded as were other costs common to all three alternatives. The cost breakdown structure utilized by this study is presented in Table IV-6.

2. Representative Classes

For the purpose of estimating most operating and maintenance cost elements under the Navy military manning alternative, and some operating and maintenance costs under the civilian manning alternatives, a representative class was identified for each ship type. The relevant operating cost data for that given ship type were extracted from the July 1976 Navy Program Factors Manual for the associated representative class. The classes were selected so as to be typical of the ships of the present and near-future fleet and are listed in Table I-1 of this volume.

TABLE IV-6

FYDP COST BREAKDOWN STRUCTURE

MPN

Direct

Indirect

- Base Operations
- Training
- Transients
- Health Activities
- Recruiting and Examining

O&MN

Direct

- Civilian Manpower
- Civilian Stores and Supplies
- Fuel
- Utilities
- Reconfiguration
- Repair Parts
- Maintenance
- Other

Indirect

- Logistic Support
- Base Operating Support
- Training
- Health Activities
- Recruiting and Examining

OPN (Fleet Modernization Program Procurement)

3. Cost Estimates

The following paragraphs describe the estimates resulting from the total FYDP cost analysis of each manning alternative.

a. Navy Military Manning. The sources of input data and the methodology used to estimate the total FYDP costs of the Navy military manning alternative are described in detail in Appendix B, Volume III. All ships, including those presently manned by Civil Service crews, were assumed to be manned by Navy Military crews. The resulting cost estimates are summarized in a comparison format in Table IV-7.

b. Navy Civil Service Manning. The sources of input data and the methodology used to estimate the total FYDP costs of the Navy Civil Service manning alternatives are described in detail in Appendix B, Volume III. All ships, except those of the AO type presently manned by Civil Service mariners, were assumed to be reconfigured to meet Navy Civil Service habitability requirements in fiscal year 1979. Subsequently, all ships were assumed to be manned by Navy Civil Service personnel and a Navy military detachment through fiscal year 1983. It was further assumed that, with one exception, any ship budgeted for entry into the fleet during the FYDP years would be built to meet civilian habitability standards. The exceptional case is covered in Appendix B, Volume III. The resulting cost estimates are summarized in a comparison format in Table IV-7.

TABLE IV-7

FYDP COST COMPARISON
FLEET SUPPORT SHIPS MANNING ALTERNATIVES¹
(Thousands of Current Year Dollars)

| SHIP TYPE | NAVY MILITARY MANNING | NAVY CIVIL SERVICE MANNING | COMMERCIAL CONTRACT MANNING |
|-----------|--------------------------|-------------------------------|--------------------------------|
| AF | 53,570 | 35,086 | 40,973 |
| AFS | 83,039 | 45,913 | 48,854 |
| AOR | 94,564 | 53,829 | 60,034 |
| AOE | 110,765 | 61,670 | 67,942 |
| AE | 69,411 | 42,397 | 47,883 |
| AO | 74,655 | 38,191 | 37,653 |
| AD | 114,598 | 90,820 | 90,634 |
| AS | 133,161 | 97,010 | 96,383 |
| AR | 89,449 | 69,270 | 62,380 |
| ARS | 22,086 | 15,856 | 15,551 |
| ASR | 36,060 | 23,597 | 21,359 |
| ATF | 19,523 | 12,333 | 16,329 |
| ATS | 28,933 | 15,347 | 17,204 |

¹ The costs displayed represent the cost of operating one of these ships over five years and include all budgeted items except those which are invariant across all three alternatives. Expressed in costs/ship type over five years.

NOTE: Navy Civil Service and Commercial Contract Manning provides fewer manned UNREP Stations than Navy Military Manning.
Also neither Combat Information Center nor Weapons are manned.

c. Commercial Contract Manning. The sources of input data and the methodology used to estimate the total FYDP costs of the Commercial Contract manning alternative are described in detail in Appendix B, Volume III. The assumptions made in the Navy Civil Service manning case relative to reconfiguration were also applied to the commercial contract manning analysis. The resulting cost estimates are summarized in a comparison format in Table IV-7.

E. TOTAL ECONOMIC COST

In addition to the above FYDP analysis, a comprehensive economic analysis was conducted for each of the three alternative manning policies under consideration. The economic cost was defined to include all relevant elements of cost incurred, or accrued as a result of a support ship's operations over its life cycle and its replacement (if any) from fiscal year 1979 to 2008 inclusive. The study addressed individually 108 ship hulls and their applicable replacements. All costs were estimated in fiscal year 1977 dollars, both discounted and undiscounted in accordance with SECNAVINST 7000.14B.

1. DOD vs Government Costs

There is a difference between the economic cost ascribed to the DOD and the economic costs ascribed to the Federal Government. In particular, the economic costs to the Government includes the lost tax revenue associated with

clothing, food, quarters, and other military allowances which are non-taxable. Therefore, both a DOD and a Government economic cost estimate were prepared.

2. Cost Breakdown Structure

In addition to the manpower resource costs described earlier, the total economic cost includes all other relevant costs incurred in the reconfiguration (where necessary), operation, maintenance, berthing, and support, of the ships under study or those costs which are considered to be variable across alternative manning policies. On this basis, new ship construction, Fleet Modernization Program procurement and installation, and base operating support were excluded from consideration. Logistic support was included because MSC incurs this cost and accounts for it in its overhead charges. The cost breakdown structure utilized by this study is presented in Table IV-8.

3. Representative Classes

The representative classes selected for each ship type as described earlier were also used in the economic analysis to extract relevant data for each ship from the Navy Program Factors Manual. This was done for the purpose of estimating most operating and maintenance cost elements under the Navy Military Manning alternative and some operating and maintenance costs under the Navy Civil Service and Commercial Contract Manning alternatives.

TABLE IV-8
ECONOMIC COST BREAKDOWN STRUCTURE

RECONFIGURATION

OPERATION

Direct

Civilian Stores and Supplies

Fuel

Utilities

Repair Parts

Other

Indirect

Logistic Support

Training

Health Activities

Recruiting and Examining

MAINTENANCE

RA/TA (Restricted Availability/Technical Availability)

Selected RA

IMA (Intermediate Maintenance Activities)

Overhaul

PERSONNEL

Navy Crew

Billet Cost

Foregone Taxes

Civilian Crew

4. Ship Inventory Profile

A projection of the operating ship inventory was performed in conformance with the Five Year Defense Plan of March 2, 1977 and the Extended Planning Annex (EPA) of December 6, 1976. A forty year life was assumed for all ships not programmed for retirement within the combined FYDP/EPA time period. All ships which would retire prior to 2008 were assumed to be replaced by a new ship of similar construction the following year. The combination of the FYDP and EPA resulted in the total number of ships changing from the original 95 to 108.

5. Cost Estimation

All assumptions made for the FYDP analysis relative to reconfiguration were also applied to the economic analysis. The sources of input data and the methodology used to estimate the total economic costs of each of the manning alternatives are described in detail in Appendix B, Volume III. Non-military manned ships can operate a greater number of days in peacetime than military manned ships because of Navy homeporting policies. Therefore, to normalize the economic cost estimates for a measure of effectiveness, the costs are displayed as 30 year totals, on an average annual basis and a productive peacetime day basis. In the case of AD, AS, and AR type ships, productive days were taken to be days in port. The resulting cost estimates are summarized by ship type in Tables IV-9 and IV-10.

TABLE IV-9

UNDISCOUNTED ECONOMIC COST COMPARISONS
(\$1000 FY 77 dollars)

| SHIP HULL | MANNING ALTERNATIVE | DOD COST | | | U.S. GOVERNMENT COST | | |
|--------------|------------------------|----------|---------------|-----------------------------|----------------------|---------------|-----------------------------|
| | | 30 YEAR | AVG ANNUAL | AVG/ PRODUC- TIVE DAY | 30 YEAR | AVG ANNUAL | AVG/ PRODUC- TIVE DAY |
| AF-58 | Navy Military | 225670 | 7522 | 61.658 | 228850 | 7628 | 62.527 |
| | Navy Civil Service | 171197 | 5707 | 46.775 | 171467 | 5716 | 46.849 |
| | Commercial Contract | 201040 | 6701 | 54.929 | 201430 | 6714 | 55.036 |
| AFS-3 | Navy Military | 338481 | 11283 | 83.576 | 344121 | 11471 | 84.968 |
| | Navy Civil Service | 208072 | 6936 | 51.376 | 208530 | 6951 | 51.489 |
| | Commercial Contract | 265740 | 8858 | 65.615 | 266318 | 8877 | 65.757 |
| AOR-4 | Navy Military | 372854 | 12428 | 102.714 | 378104 | 12603 | 104.161 |
| | Navy Civil Service | 245571 | 8186 | 67.650 | 245991 | 8200 | 67.766 |
| | Commercial Contract | 322035 | 10735 | 88.715 | 322515 | 10751 | 88.847 |

NOTE: Navy Civil Service and Commercial Contract Manning provides fewer manned UNREP Stations than Navy Military Manning. Also, neither Combat Information Center nor Weapons are manned.

TABLE IV-9
(CONT.)
UNDISCOUNTED ECONOMIC COST COMPARISONS
(\$1000 FY 77 dollars)

| SHIP HULL | MANNING ALTERNATIVE | DOD COST | | | U.S. GOVERNMENT COST | | |
|--------------|------------------------|----------|---------------|-----------------------------|----------------------|---------------|-----------------------------|
| | | 30 YEAR | AVG ANNUAL | AVG/ PRODUC- TIVE DAY | 30 YEAR | AVG ANNUAL | AVG/ PRODUC- TIVE DAY |
| AOE-4 | Navy Mili- tary | 463238 | 15441 | 200.536 | 470258 | 15675 | 203.575 |
| | Navy Civil Service | 302574 | 10086 | 130.984 | 303174 | 10106 | 131.244 |
| | Commercial Contract | 372945 | 12432 | 161.448 | 373665 | 12456 | 161.760 |
| AE-28 | Navy Mili- tary | 295958 | 9865 | 123.316 | 300728 | 10024 | 125.303 |
| | Navy Civil Service | 198079 | 6603 | 82.533 | 198499 | 6617 | 82.708 |
| | Commercial Contract | 232989 | 7766 | 97.079 | 233619 | 7787 | 97.341 |
| AO-177 | Navy Mili- tary | 281748 | 9392 | 60.984 | 284238 | 9475 | 61.523 |
| | Navy Civil Service | 169805 | 5660 | 36.754 | 170105 | 5670 | 36.819 |
| | Commercial Contract | 199731 | 6658 | 43.232 | 200001 | 6667 | 43.290 |

TABLE IV-9
(CONT.)
UNDISCOUNTED ECONOMIC COST COMPARISONS
(\$1000 FY 77 dollars)

| SHIP HULL | MANNING ALTERNATIVE | DOD COST | | | U.S. GOVERNMENT COST | | |
|--------------|------------------------|----------|---------------|-----------------------------|----------------------|---------------|-----------------------------|
| | | 30 YEAR | AVG ANNUAL | AVG/ PRODUC- TIVE DAY | 30 YEAR | AVG ANNUAL | AVG/ PRODUC- TIVE DAY |
| AD-37 | Navy Mili- tary | 622087 | 20736 | 64.398 | 637507 | 21250 | 65.995 |
| | Navy Civil Service | 499033 | 16634 | 51.660 | 508753 | 16958 | 52.666 |
| | Commercial Contract | 524892 | 17496 | 54.337 | 534612 | 17820 | 55.343 |
| | Navy Mili- tary | 699769 | 23326 | 67.221 | 715939 | 23865 | 68.774 |
| AS-36 | Navy Civil Service | 551338 | 18378 | 52.962 | 562858 | 18762 | 54.069 |
| | Commercial Contract | 577059 | 19235 | 55.433 | 588579 | 19619 | 56.540 |
| | Navy Mili- tary | 153662 | 13969 | 43.791 | 157017 | 14274 | 44.747 |
| | Navy Civil Service | 134213 | 12201 | 38.248 | 136050 | 12368 | 38.772 |
| AR-6 | Commercial Contract | 137999 | 12545 | 39.327 | 139836 | 12712 | 39.851 |

TABLE IV-9
(CONT.)
UNDISCOUNTED ECONOMIC COST COMPARISONS
(\$1000 FY 77 dollars)

| SHIP HULL | MANNING ALTERNATIVE | DOD COST | | | U.S. GOVERNMENT COST | | |
|--------------|------------------------|----------|---------------|-----------------------------|----------------------|---------------|-----------------------------|
| | | 30 YEAR | AVG ANNUAL | AVG/ PRODUC- TIVE DAY | 30 YEAR | AVG ANNUAL | AVG/ PRODUC- TIVE DAY |
| ARS-41 | Navy Mili- tary | 26225 | 3278 | 18.417 | 26601 | 3325 | 18.681 |
| | Navy Civil Service | 19306 | 2413 | 13.557 | 19330 | 2416 | 13.574 |
| | Commercial Contract | 19938 | 2492 | 14.001 | 19970 | 2496 | 14.024 |
| ASR-22 | Navy Mili- tary | 166476 | 5549 | 65.285 | 169236 | 5641 | 66.367 |
| | Navy Civil Service | 110669 | 3689 | 43.400 | 111089 | 3703 | 43.564 |
| | Commercial Contract | 117947 | 3932 | 46.254 | 118427 | 3948 | 46.442 |
| ATF-166 | Navy Mili- tary | 75830 | 2528 | 15.700 | 76490 | 2550 | 15.836 |
| | Navy Civil Service | 53268 | 1776 | 11.029 | 53328 | 1778 | 11.041 |
| | Commercial Contract | 75517 | 2517 | 15.635 | 75667 | 2522 | 15.666 |

TABLE IV-9

(CONT.)

UNDISCOUNTED ECONOMIC COST COMPARISONS
(\$1000 FY 77 dollars)

| SHIP HULL | MANNING ALTERNATIVE | DOD COST | | | U.S. GOVERNMENT COST | | |
|--------------|------------------------|----------|---------------|-----------------------------|----------------------|---------------|-----------------------------|
| | | 30 YEAR | AVG ANNUAL | AVG/ PRODUC- TIVE DAY | 30 YEAR | AVG ANNUAL | AVG/ PRODUC- TIVE DAY |
| ATS-1 | Navy Military | 139803 | 4660 | 28.945 | 141573 | 4719 | 29.311 |
| | Navy Civil Service | 80657 | 2689 | 16.699 | 80867 | 2696 | 16.743 |
| | Commercial Contract | 90243 | 3008 | 18.684 | 90483 | 3016 | 18.733 |

TABLE IV-10

DISCOUNTED ECONOMIC COST COMPARISONS
(\$1000 FY 77 dollars)

| SHIP HULL | MANNING ALTERNATIVE | DOD COST | | | U.S. GOVERNMENT COST | | |
|--------------|------------------------|----------|---------------|-----------------------------|----------------------|---------------|-----------------------------|
| | | 30 YEAR | AVG ANNUAL | AVG/ PRODUC- TIVE DAY | 30 YEAR | AVG ANNUAL | AVG/ PRODUC- TIVE DAY |
| AF-58 | Navy Milli- tary | 73921 | 2464 | 20.197 | 74970 | 2499 | 20.484 |
| | Navy Civil Service | 56532 | 1884 | 15.446 | 56622 | 1887 | 15.470 |
| | Commercial Contract | 66378 | 2213 | 18.136 | 66507 | 2217 | 18.171 |
| AFS-3 | Navy Milli- tary | 117834 | 3928 | 29.095 | 119695 | 3990 | 29.554 |
| | Navy Civil Service | 73986 | 2466 | 18.268 | 74142 | 2471 | 18.307 |
| | Commercial Contract | 88951 | 2965 | 21.963 | 89146 | 2972 | 22.011 |
| AOR-4 | Navy Milli- tary | 124789 | 4160 | 34.377 | 126521 | 4217 | 34.854 |
| | Navy Civil Service | 85748 | 2858 | 23.622 | 85886 | 2863 | 23.660 |
| | Commercial Contract | 107092 | 3570 | 29.502 | 107250 | 3575 | 29.545 |

NOTE: Navy Civil Service and Commercial Contract Manning provides fewer manned UNREP Stations than Navy Military Manning. Also, neither Combat Information Center nor Weapons are manned.

TABLE IV-10
(CONT.)
DISCOUNTED ECONOMIC COST COMPARISONS
(\$1000 FY 77 dollars)

| SHIP HULL | MANNING ALTERNATIVE | 30 YEAR | DOD COST | | U.S. GOVERNMENT COST | | |
|--------------|------------------------|---------|---------------|-----------------------------|----------------------|---------------|-----------------------------|
| | | | AVG ANNUAL | AVG/ PRODUC- TIVE DAY | 30 YEAR | AVG ANNUAL | AVG/ PRODUC- TIVE DAY |
| AOE-4 | Navy Mili- tary | 152187 | 5073 | 65.882 | 154503 | 5150 | 66.884 |
| | Navy Civil Service | 103965 | 3466 | 45.007 | 104163 | 3472 | 45.092 |
| | Commercial Contract | 123901 | 4130 | 53.637 | 124139 | 4138 | 53.740 |
| AE-28 | Navy Mili- tary | 97225 | 3241 | 40.511 | 98799 | 3293 | 41.166 |
| | Navy Civil Service | 69119 | 2304 | 28.799 | 69257 | 2309 | 28.857 |
| | Commercial Contract | 77607 | 2587 | 32.336 | 77815 | 2594 | 32.423 |
| AO-177 | Navy Mili- tary | 88556 | 2952 | 19.168 | 89378 | 2979 | 19.346 |
| | Navy Civil Service | 55312 | 1844 | 11.972 | 55411 | 1847 | 11.994 |
| | Commercial Contract | 65192 | 2173 | 14.111 | 65282 | 2176 | 14.130 |

TABLE IV-10

(CONT.)

DISCOUNTED ECONOMIC COST COMPARISONS
(\$1000 FY 77 dollars)

| SHIP HULL | MANNING ALTERNATIVE | DOD COST | | | U.S. GOVERNMENT COST | | |
|--------------|------------------------|----------|---------------|-----------------------------|----------------------|---------------|-----------------------------|
| | | 30 YEAR | AVG ANNUAL | AVG/ PRODUC- TIVE DAY | 30 YEAR | AVG ANNUAL | AVG/ PRODUC- TIVE DAY |
| AD-37 | Navy Mili- tary | 210229 | 7008 | 21.763 | 215317 | 7177 | 22.290 |
| | Navy Civil Service | 168601 | 5620 | 17.453 | 171808 | 5727 | 17.785 |
| | Commercial Contract | 173848 | 5795 | 17.997 | 177055 | 5902 | 18.329 |
| AS-36 | Navy Mili- tary | 230879 | 7696 | 22.179 | 236215 | 7874 | 22.691 |
| | Navy Civil Service | 185626 | 6188 | 17.832 | 189427 | 6314 | 18.197 |
| | Commercial Contract | 190695 | 6356 | 18.318 | 194496 | 6483 | 18.684 |
| AR-6 | Navy Mili- tary | 94283 | 8571 | 26.869 | 96363 | 8760 | 27.462 |
| | Navy Civil Service | 87895 | 7990 | 25.049 | 89034 | 8094 | 25.373 |
| | Commercial Contract | 86187 | 7835 | 24.562 | 87326 | 7939 | 24.886 |

TABLE IV-10
(CONT.)
DISCOUNTED ECONOMIC COST COMPARISONS
(\$1000 FY 77 dollars)

| SHIP HULL | MANNING ALTERNATIVE | DOD COST | | | U.S. GOVERNMENT COST | | |
|--------------|------------------------|----------|---------------|-----------------------------|----------------------|---------------|-----------------------------|
| | | 30 YEAR | AVG ANNUAL | AVG/ PRODUC- TIVE DAY | 30 YEAR | AVG ANNUAL | AVG/ PRODUC- TIVE DAY |
| ARS-41 | Navy Mili- tary | 18324 | 2290 | 12.868 | 18587 | 2323 | 13.053 |
| | Navy Civil Service | 14089 | 1761 | 9.894 | 14106 | 1763 | 9.906 |
| | Commercial Contract | 14095 | 1762 | 9.898 | 14117 | 1765 | 9.914 |
| ASR-22 | Navy Mili- tary | 56669 | 1889 | 22.223 | 57579 | 1919 | 22.580 |
| | Navy Civil Service | 39056 | 1302 | 15.316 | 39195 | 1307 | 15.371 |
| | Commercial Contract | 39089 | 1303 | 15.329 | 39248 | 1308 | 15.391 |
| ATF-166 | Navy Mili- tary | 24731 | 824 | 5.120 | 24949 | 832 | 5.165 |
| | Navy Civil Service | 17186 | 573 | 3.558 | 17206 | 574 | 3.562 |
| | Commercial Contract | 24531 | 818 | 5.079 | 24580 | 819 | 5.089 |

TABLE IV-10
(CONT.)
DISCOUNTED ECONOMIC COST COMPARISONS
(\$1000 FY 77 dollars)

| SHIP HULL | MANNING ALTERNATIVE | DOD COST | | | U.S. GOVERNMENT COST | | |
|--------------|------------------------|----------|---------------|-----------------------------|----------------------|---------------|-----------------------------|
| | | 30 YEAR | AVG ANNUAL | AVG/ PRODUC- TIVE DAY | 30 YEAR | AVG ANNUAL | AVG/ PRODUC- TIVE DAY |
| ATS-1 | Navy Mili- tary | 46797 | 1560 | 9.689 | 47381 | 1579 | 9.810 |
| | Navy Civil Service | 26800 | 893 | 5.549 | 26869 | 896 | 5.563 |
| | Commercial Contract | 30068 | 1002 | 6.225 | 30147 | 1005 | 6.242 |

6. Comparative Analysis

The estimates of the total FYDP cost of the ship support fleet for each of the manning alternatives displayed in Table IV-7 demonstrate the short run funding impact of the expanded implementation of the civilian manning concept. To assess the long term economic impact of selecting one alternative over another, the undiscounted economic cost estimates projected for thirty years (1979 through 2008) were reviewed and compared.

Table IV-11 presents the expected FYDP and economic cost savings to DOD and the U.S. Government which would result from expansion of the civilian manning concept. This table displays total FYDP and annual economic cost differentials. The economic cost differences are presented for hull numbers each of which was selected as representative of all ships of that type.

a. Military vs. Civilian. For every ship type studied, significant cost savings can be expected from the implementation of either civilian manning alternative. This reflects the fact that current Navy military crews are larger than comparable civilian crews.

Another cost element which contributes to the expected cost savings is the maintenance policy. Under Navy military manning, the Navy programs major overhauls at regular, relatively long intervals. Under MSC operation, major and minor overhauls of varying magnitude are scheduled

TABLE IV-11

EXPECTED COST SAVINGS¹

| SHIP | | A ² | | B ³ | | C ⁴ | | | | |
|------|------|-------------------|-----------------------|----------------|--------|----------------|-----------|--------|----------|-----------|
| TYPE | HULL | FYDP ⁵ | ECON DOD ⁶ | ECON GOVT. | FYDP | ECON DOD | ECON GOVT | FYDP | ECON DOD | ECON GOVT |
| AF | 58 | 18,484 | 1,815 | 1,912 | 12,597 | 821 | 914 | 5,887 | 994 | 998 |
| AFS | 3 | 37,126 | 4,347 | 4,520 | 34,185 | 2,425 | 2,594 | 2,953 | 1,922 | 1,926 |
| AOR | 4 | 40,735 | 4,242 | 4,403 | 34,530 | 1,693 | 1,852 | 11,013 | 2,549 | 2,551 |
| AOE | 4 | 49,095 | 5,355 | 5,569 | 42,823 | 3,009 | 3,219 | 6,272 | 2,346 | 2,350 |
| AE | 28 | 27,014 | 3,262 | 3,407 | 21,528 | 2,099 | 2,237 | 5,486 | 1,163 | 1,170 |
| AO | 177 | 36,464 | 3,908 | 3,981 | 37,002 | 2,910 | 2,981 | -538 | 998 | 997 |
| AD | 37 | 23,778 | 4,102 | 4,292 | 23,964 | 3,240 | 3,430 | -186 | 862 | 862 |
| AS | 36 | 36,151 | 4,948 | 5,103 | 36,778 | 4,091 | 4,246 | -627 | 857 | 857 |
| AR | 6 | 20,179 | 1,768 | 1,906 | 27,069 | 1,424 | 1,562 | -6,890 | 344 | 344 |
| ARS | 41 | 6,230 | 865 | 909 | 6,535 | 786 | 829 | -305 | 79 | 80 |
| ASR | 22 | 12,463 | 1,860 | 1,938 | 14,701 | 1,617 | 1,693 | -2,238 | 243 | 245 |
| ATF | 166 | 7,190 | 752 | 772 | 3,194 | 11 | 28 | 3,998 | 741 | 744 |
| ATS | 1 | 13,586 | 1,971 | 2,023 | 11,729 | 1,652 | 1,703 | 1,857 | 319 | 320 |

IV-32

1. FYDP Costs are in thousands of current year dollars. Economic Costs are in thousands of FY-77 year dollars.

2. A = Navy Military - Navy Civil Service.

3. B = Navy Military - Commercial Contract.

4. C = Commercial Contract - Navy Civil Service.

5. FYDP cost is total over five years, per ship.

6. Economic costs are on average annual basis, per ship.

in alternate years over a six year cycle. The average annual overhaul incurred under the present Navy and MSC policy are presented, in fiscal year 1977 dollars, in Table IV-12 for each of the thirteen types of ship studied.

b. Navy Civil Service vs. Commercial Contract. For every ship type studied, the Navy Civil Service manning alternative provides greater economic cost savings than the commercial contract alternative. Analysis shows that the costs of vacations and of retirement for Civil Service personnel are substantially lower than for their industrial counterparts, and that these two areas contribute to the large difference in cost.

Although the estimates of the cost of ship reconfiguration for civilian manning provided by MARAD are much lower than those provided by MSC (except for ATS type ships), they constitute only a small portion of the total cost difference when averaged across thirty years. The large relative difference between these reconfiguration cost estimates reflects the differences between the approaches taken by MARAD and MSC. The average unit reconfiguration costs are presented in Table IV-13 as provided by MARAD and MSC.

F. SUBSTITUTION OF COMMERCIAL CONTRACT RADIO OFFICERS FOR THE NAVY MILITARY COMMUNICATIONS DETACHMENT

The civilian manning levels examined above were based on the assumption that the communications function on

TABLE IV-12
ANNUALIZED OVERHAUL COST COMPARISON¹

| SHIP TYPE | MILITARY ² MANNING | CIVILIAN ³ MANNING |
|--------------|----------------------------------|----------------------------------|
| AF | 2010 | 1002 |
| AFS | 2151 | 1289 |
| AOR | 2575 | 1928 |
| AOE | 3272 | 2357 |
| AE | 1449 | 1291 |
| AO | 2626 | 1017 |
| AD | 1721 | 1060 |
| AS | 2377 | 1321 |
| AR | 1592 | 1131 |
| ARS | 548 | 666 |
| ASR | 1288 | 912 |
| ATF | 570 | 541 |
| ATS | 1174 | 945 |

1. Costs are in thousands of FY 77 dollars.
2. Obtained from Navy Program Factors Manual and converted to FY 77 dollars. Does not include restricted availability, technical availability and FMP costs.
3. Estimated by the Military Sealift Command.

TABLE IV-13

UNIT RECONFIGURATION COSTS¹

| SHIP TYPE | MSC ESTIMATE | MARAD ESTIMATE |
|--------------|-----------------|-------------------|
| AF | 0 | 0 |
| AFS | 6,961 | 790 |
| AOR | 2,894 | 1,060 |
| AOE | 6,097 | 1,105 |
| AE | 5,540 | 930 |
| AO | 5,554 | 780 |
| AD | 5,248 | 250 |
| AS | 5,465 | 258 |
| AR | 13,302 | 1,775 |
| ARS | 1,892 | 260 |
| ASR | 3,774 | 165 |
| ATF | 0 | 0 |
| ATS | 75 | 240 |

1. Costs are in thousands of FY 77 dollars.

a ship would be performed by military personnel. The Maritime Administration has stated that these functions, including cryptography, could be carried out by commercial contract personnel. The following subanalysis was performed to evaluate the changes in manning and costs that would result from using Commercial Contract radio operators in place of Navy communications personnel.

Table IV-14 shows ship by ship the changes in Commercial Contract and Military personnel resulting from such a conversion. Columns (1) and (2) showing Navy military manning were taken from Appendix A, Volume III, of this report. Columns (3) and (4) showing commercial contract manning were provided by the Maritime Administration. The changes in numbers of military and commercial contract personnel were obtained by subtracting (3) from (1) and (4) from (2).

Table IV-15 shows these changes per individual ship projected to the fleet of 95 ships under consideration. Overall, about 1700 military positions would be eliminated with an increase of about 300 Commercial Contract positions.

Tables IV-16 and IV-17 show ship by ship changes in annual costs that accompany the personnel changes in Table IV-14. These costs were estimated by use of the methodology and cost elements described in this section. Table IV-16 contains FYDP costs; it provides a measure of how the change would affect the Navy's cash flow. Table IV-17 contains

TABLE IV-14

CHANGES IN COMMERCIAL CONTRACT AND
MILITARY PERSONNEL RESULTING FROM
THE SUBSTITUTION OF COMMERCIAL CONTRACT
RADIO OFFICERS FOR NAVY MILITARY
COMMUNICATIONS DETACHMENT PERSONNEL

INDIVIDUAL SHIPS
(PERSONS)

| Type | Previous Communications ^{1/} Function Manning | | Substitution | | Change per Ship | |
|------|-----------------------------------------------------------|------|--------------------------------------|------|------------------------|------|
| | Commercial Contract | Mil. | Commercial Contract ^{2/} | Mil. | Commercial Contract | Mil. |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| AF | 1 | 16 | 4 | 0 | +3 | -16 |
| AFS | 1 | 23 | 6 | 0 | +5 | -23 |
| AOR | 1 | 22 | 8 | 0 | +7 | -22 |
| AOE | 1 | 22 | 8 | 0 | +7 | -22 |
| AE | 1 | 14 | 3 | 0 | +2 | -14 |
| AO | 1 | 13 | 4 | 0 | +3 | -13 |
| AD | 1 | 27 | 5 | 0 | +4 | -27 |
| AS | 1 | 27 | 5 | 0 | +4 | -27 |
| AR | 1 | 28 | 5 | 0 | +4 | -28 |
| ARS | 1 | 8 | 1 | 0 | 0 | - 8 |
| ASR | 1 | 12 | 4 | 0 | +3 | -12 |
| ATF | 1 | 10 | 1 | 0 | 0 | -10 |
| ATS | 1 | 7 | 1 | 0 | 0 | - 7 |

^{1/}
Tables A-55 through A-67 of Appendix A.

^{2/}
Maritime Administration Estimates.

TABLE IV-15

CHANGES IN COMMERCIAL CONTRACT AND
MILITARY PERSONNEL RESULTING FROM
THE SUBSTITUTION OF COMMERCIAL CONTRACT
RADIO OFFICERS FOR NAVY MILITARY
COMMUNICATIONS DETACHMENT PERSONNEL

ALL SHIPS UNDER CONSIDERATION
(PERSONS)

| <u>Ship Type</u> | <u>Total Number of Ships</u> | <u>Change For All Ships of a Type</u> | |
|----------------------|------------------------------------------|-------------------------------------------|-------------|
| | | <u>Commercial Contract</u> | <u>Mil.</u> |
| | (1) | (2) | (3) |
| AF | 1 | + 3 | - 16 |
| AFS | 7 | +35 | -161 |
| AOR | 7 | +49 | -154 |
| AOE | 4 | +28 | - 88 |
| AE | 13 | +26 | -182 |
| AO | 16 | +48 | -208 |
| AD | 9 | +36 | -243 |
| AS | 12 | +48 | -324 |
| AR | 4 | +16 | -112 |
| ARS | 6 | 0 | - 48 |
| ASR | 6 | +18 | - 72 |
| ATF | 7 | 0 | - 70 |
| ATS | 3 | 0 | - 21 |
| TOTAL | 95 | 307 | -1,699 |

TABLE IV-16

CHANGES IN ANNUAL FYDP COSTS PER SHIP RESULTING FROM THE
SUBSTITUTION OF COMMERCIAL, CONTRACT RADIO OFFICERS FOR
NAVY MILITARY COMMUNICATIONS DETACHMENT PERSONNEL

(\$1,000's)

| Ship Type | Old Radio Union Pro- posal (1) | Navy Communications Detachment (2) | Old Total Cost (3) | New Radio Union Pro- posal/ (4) | Delta FYDP Cost for Type of Ship (5) |
|--------------|-----------------------------------------|---------------------------------------------|-----------------------------|------------------------------------------|-----------------------------------------------|
| AF | \$63 | \$160 | \$223 | \$226 | \$ +3 |
| AFS | 67 | 225 | 292 | 336 | +44 |
| AOR | 80 | 225 | 305 | 604 | +299 |
| AOE | 80 | 225 | 305 | 589 | +284 |
| AE | 67 | 147 | 214 | 171 | -43 |
| AO | 80 | 132 | 212 | 294 | +82 |
| AD | 67 | 272 | 339 | 281 | -58 |
| AS | 67 | 270 | 337 | 281 | -56 |
| AR | 63 | 265 | 328 | 281 | -47 |
| ARS | 61 | 86 | 147 | 60 | -87 |
| ASR | 65 | 170 | 235 | 226 | -9 |
| ATF | 65 | 106 | 171 | 60 | -111 |
| ATS | 65 | 80 | 145 | 60 | -85 |

1/

MarAd, Maritime Contract Impact Personnel Cost System computer run of 5 Aug 77.

TABLE IV-17

CHANGES IN ANNUAL UNDISCOUNTED ECONOMIC COSTS PER SHIP RESULTING FROM THE
SUBSTITUTION OF COMMERCIAL CONTRACT RADIO OFFICERS FOR NAVY
MILITARY COMMUNICATIONS DETACHMENT PERSONNEL

(\$1,000's)

| Ship Type | Old Radio Union Pro- posal (1) | Navy Communications Detachment (2) | Old Total Cost (3) | New Radio Union Pro- posal (4) | Delta Economic Cost for Type of Ship (5) |
|--------------|-----------------------------------------|---------------------------------------------|-----------------------------|-----------------------------------------|---------------------------------------------------|
| AF | \$63 | \$231 | \$294 | \$226 | \$ -68 |
| AFS | 67 | 325 | 392 | 336 | -56 |
| AOR | 80 | 325 | 405 | 604 | +199 |
| AOE | 80 | 325 | 405 | 589 | +184 |
| AE | 67 | 325 | 280 | 171 | -109 |
| AO | 80 | 192 | 272 | 294 | +22 |
| AD | 67 | 392 | 459 | 281 | -178 |
| AS | 67 | 386 | 453 | 281 | -172 |
| AR | 63 | 379 | 442 | 281 | -161 |
| ARS | 61 | 123 | 184 | 60 | -124 |
| ASR | 65 | 239 | 304 | 226 | -78 |
| ATF | 65 | 151 | 216 | 60 | -156 |
| ATS | 65 | 114 | 176 | 60 | -119 |

1/

MarAd, Maritime Contract Impact Personnel Cost System computer run of 5 Aug. 77.

economic costs; it provides a measure of overall economic impact of the change at the Defense Department level.

The contract manning estimates in Column (4) of Tables IV-16 and IV-17 were obtained from the "Personnel Cost Report" of August 5, 1977, produced by MARAD's Maritime Cost Impact System computer program.

The pay rates employed were those current as of December 1, 1976, and the pay estimates represent current, annual, undiscounted costs.

In terms of FYDP costs, change of the communications function to commercial contract manning increases the annual costs of the AO, AOE, AOR, AFS and AF. FYDP costs of the other ships are decreased. In terms of economic costs, the change increases the annual cost of the AO, AOE, and AOR. Economic costs of the other ships are decreased.

MARAD proposes that Commercial Contract radio officers replace Navy military communication personnel aboard commercial contract operated ships on the basis of approximately one commercial operator for three military. They have also proposed one additional radio operator when the ships operate in task groups. This disparity in numbers of personnel suggests that MARAD's perception of the volume of radio traffic to be maintained may have to be changed and an upward revised estimate of personnel requirements may be necessary if one were to consider the substitution of the military detachment by REOs.

V. MISSION FULFILLMENT CAPABILITIES

A. OBJECTIVE

In the substitution of civilian mariners for Navy military personnel aboard the Navy's fleet support ships, naval decision-makers and planners are concerned with possible loss of mission fulfillment capabilities, and especially those losses or changes that may degrade the fleet services to be provided. Accordingly, the purpose of this analysis is to draw a comparison between the civilian manned and Navy military manned fleet support ships so as to identify those mission area where civilian manning is not comparable to military manning, and to describe the impact upon the capability of the civilian manned ships to perform assigned missions and the required fleet services.

B. MISSION AREAS AND REQUIRED OPERATIONAL CAPABILITY

1. Naval combat readiness criteria are described in a Chief of Naval Operations instruction^{1/} defining naval missions, mission areas, and required operational capabilities (ROCs) in support of mission areas. Mission areas are designated either primary (P) or secondary (S) for each type of naval ship or unit. Table V-1 shows all the mission areas, whether primary or secondary, and the more significant required operational capabilities for each mission for each type of fleet support ship. Operational

^{1/}OPNAV Instruction 3501.2C, Subj: "Naval Readiness Criteria", dated 11 Dec 1972.

TABLE V-1

FLEET SUPPORT SHIPS (FSS)
ABRIDGED REQUIRED OPERATIONAL CAPABILITIES
(ROCs)

MISSION AREAS AND PRIORITY

REQUIRED OPERATIONAL CAPABILITIES

MOBILITY (MOB)

Primary mission for all Fleet Support Ships

- Steam to designed capability
- Repair Engineering casualties
- Control damage
- Maneuver in formation

COMMAND AND CONTROL (CAC)

Primary mission for all FSS

- Command control and communications facilities for embarked Officer Tactical Command and staff
- Coordinate and control task organizations
- Provide communications for coordination and control of task organization
- Provide own-unit's command & control functions

ANTI-AIR WARFARE (AAW)

Secondary mission for all FSS

- Detect, identify, & track air targets
- Engage air targets with surface to air armament
- Conduct electronic warfare (EW) against air targets

SURFACE WARFARE (SUW)

Secondary mission for all FSS

- Engage surface targets with anti-surface armaments
- Detect, identify, & track surface targets
- Conduct electronic warfare (EW) against targets

TABLE V-1 Cont.

SPECIAL WARFARE (SPW)

Secondary mission, only applicable to ARS, ATF & ATS

- Conduct surveillance & reconnaissance
- Conduct navigation or weather station operations
- Conduct search and rescue (SAR) operations in a combat environment

OPERATIONS

FLEET SUPPORT OPERATIONS (FSO)

Primary mission for all FSS

- Conduct underway replenishment
- Conduct towing/salvage/rescue operations
- Repair and overhaul ships
- Support ships and aircraft in supplies, ordnance and other services
- Provide sealift for cargo & personnel
- Provide explosive ordnance disposal services

NONCOMBAT OPERATIONS (NCO)

Primary mission for AD, AS, AR

Secondary mission for AF, AFS, AOE, AE, AO, ARS, ASR, ATF, ATS

- Conduct search and rescue
- Relay naval communications
- Conduct meteorological, hydrographic, and/or oceanographic surveys
- Provide fleet training services
- Provide medical/dental care
- Provide administration and supply support for own-unit
- Provide upkeep and maintenance of own-unit
- Provide nuclear weapons readiness for ship's squadron's weapons systems
- Conduct diving operations

capabilities that are omitted for brevity are those that are, for example in the Mobility Mission Area, either not applicable, e.g.:

- Provide adequate flyable aircraft
- Transfer on short notice
- Refuel in the air
- Operate from an aircraft carrier or ship with a helicopter platform
- Maintain nuclear propulsion readiness
- Maintain mount-out capabilities or implied, e.g.:
- Perform seamanship, airmanship and navigation tasks
- Replenish at sea

A similar condensation was carried out for all other fleet support ship principal and secondary mission areas. To do otherwise, would have required more detail than needed to make a valid comparison of the civilian manned ship ROC to its Navy manned counterpart ship ROC.

2. Each mission area consists of the ability to perform the above described required operational capabilities (ROCs). Levels of capability were assigned as a full (F), partial (P), or lost (L). As noted in Section III, Manpower Requirements Analysis, ship manning documents (SMDs) use the ROCs to determine the levels of manpower

needed to fulfill mission area required operational capabilities.

C. PROJECTED OPERATIONAL ENVIRONMENT

1. The projected operational environment (POE)^{1/} statement describes the conditions of manning readiness that each naval ship and unit must achieve. Each ROC is prefaced with a POE statement that provides a scenario which describes these levels of readiness. The typical POE statement for a Navy military manned fleet support ship requires that the ship organizational manpower must be able to accomplish the following:

- a. at sea in wartime.
- b. capable of performing all defense functions simultaneously while in Manning Readiness Condition I (Battle).
- c. capable of maintaining continuous Manning Readiness III (Three Section Watch) at sea.
- d. conduct underway replenishment (MLSF ships), or provide repair ships or towing, salvage, and rescue operations (minor support ships).
- e. capable of performing all maintenance for which ship's company is responsible.

2. The POE capability for civilian manned counterpart ships excludes Readiness Condition I because

^{1/}Footnoted in Section III-A

civilian mariners are embarked as non-combatants. However, they are prepared to operate under hostile conditions.

3. The POE statements for MLSF ships engaging in underway replenishment specifically describes the number of UNREP stations to be manned to port and starboard, as shown in Table V-2, and establishes the number of hours per week that the MLSF ship is expected to conduct UNREP and VERTREP.

Table V-3 shows the expected CONREP AND VERTREP work week set by current POEs.

D. SHIP COMPARISONS

1. Navy military manned fleet support ships are used as the basis for a comparative qualitative analysis of the operational capabilities of Navy Civil Service manned ships and commercial contract manned ships. Using the abridged ROC shown in Table V-1 and the current ROCs for the representative Navy manned fleet support ships, a comparative analysis has been prepared. The results are shown in Matrix form in Volume IV, Appendix K¹. An unclassified summary is shown in Table V-4. No attempt has been made to compare the efficiency of Navy Civil Service mariners and Commercial Contract seamen. For the purposes of this analysis the civilian crews are assumed to be as competent as their Navy military counterparts regardless of whether affiliated with the Civil Service or the commercial

¹Navy ROCs are classified CONFIDENTIAL

TABLE V-2

MLSF CARGO TRANSFER CAPABILITIES
FLEET UNREP SUPPORT SHIPS

| SHIP CLASS | VARIANTS | FAS | | RAS | | VERTREP | VERTREP + FAS + RAS |
|---------------|----------------------------|------|------|------|------|---------|---------------------------|
| | | PORT | STBD | PORT | STBD | | |
| AOE 1 | 1. No. of UNREP Stations | 4 | 2 | 5 | 4 | 1 | 16 |
| | 2. Navy SMD Manning Level | 4 | 2 | 3 | 1 | 1 | 11 |
| | 3. MSC/MARAD Manning Level | | | | | | 8 |
| AOR 1 | 1. No. of UNREP Stations | 4 | 3 | 2 | 2 | 1 | 12 |
| | 2. Navy SMD Manning Level | 3 | 2 | 2 | 1 | 1 | 9 |
| | 3. MSC/MARAD Manning Level | | | | | | 6 |
| AFS 1 | 1. No. of UNREP Stations | - | - | 5 | 5 | 1 | 11 |
| | 2. Navy SMD Manning Level | - | - | 3 | 2 | 1 | 6 |
| | 3. MSC/MARAD Manning Level | | | | | | 5 |
| AE 21 | 1. No. of UNREP Stations | - | - | 7 | 7 | 1 | 15 |
| | 2. Navy SMD Manning Level | - | - | 4 | 3 | 1 | 8 |
| | 3. MSC/MARAD Manning Level | | | | | | 5 |
| AE 26/ 28 | 1. No. of UNREP Stations | - | - | 5 | 4 | 1 | 10 |
| | 2. Navy SMD Manning Level | - | - | 4 | 3 | 1 | 8 |
| | 3. MSC/MARAD Manning Level | | | | | | 5 |
| AO 177 | 1. No. of UNREP Stations | 3 | 2 | 1 | 1 | 1 | 8 |
| | 2. Navy SMD Manning Level | 3 | 2 | 1 | 1 | 1 | 8 |
| | 3. MSC/MARAD Manning Level | | | | | | 5 |
| AF 58 | 1. No. of UNREP Stations | - | - | 6 | 6 | - | 12 |
| | 2. Navy SMD Manning Level | - | - | - | - | - | - |
| | 3. MSC/MARAD Manning Level | | | | | | 5 |

TABLE V-3

MLSF SHIPS
LIMITING PERIOD OF UNREP OPERATIONS
(POE STATEMENTS)

| SHIP | HOURS/WEEK NORMALLY NOT TO EXCEED | |
|-------------|-----------------------------------|----------------|
| <u>Type</u> | <u>CONREP</u> | <u>VERTREP</u> |
| AF | (Note 1) | (Note 1) |
| AFS | 28 | 32 |
| AOR | 32 | 20 |
| AOE | 32 | 32 |
| AE | 32 | 20 |
| AO | 32 | 20 |

NOTE 1: Navy Civil Service and Commercial Contract Manning provides fewer manned UNREP stations than Navy Military Manning. Also, neither the Combat Information Center nor Weapons are manned.

TABLE V-4

SUMMARY COMPARISON
FLEET SUPPORT SHIP OPERATIONAL CAPABILITIES
NAVY MILITARY MANNING VS
CIVILIAN (READINESS CONDITION III) MANNING

| MISSION | SHIP TYPE | MANNING | PRIMARY | | | | SECONDARY | | | |
|---------------|-----------|---------------|------------------------------------------|------------------------------------------------------------|------------------------------------------|------------------------------------------|------------------------------------------|------------------------------------------|----------------|-----|
| | | | MOB | CAC | FSO | NCO | NCO | AAW | SUW | SPW |
| STATION | AOE | NAVY MILITARY | F ₄ | F ₄ | F ₅ | | F ₇ ^P ₁ | F ₃ | F ₃ | |
| | | CIVILIAN | F ₃ ^P ₁ | F ₁ ^P ₂ L ₁ | F ₄ ^P ₁ | | F ₆ ^P ₂ | L ₃ | L ₃ | |
| | AOR | NAVY MILITARY | F ₄ | F ₄ | F ₄ ^P ₁ | | F ₇ ^P ₁ | F ₂ | F ₂ | |
| | | CIVILIAN | F ₃ ^P ₁ | F ₁ ^P ₂ L ₁ | F ₃ ^P ₂ | | F ₆ ^P ₂ | L ₂ | L ₂ | |
| SHUTTLE | AF | NAVY MILITARY | F ₄ | F ₄ | F ₃ ^P ₁ | | F ₆ ^P ₁ | F ₁ ^P ₁ | F ₂ | |
| | | CIVILIAN | F ₃ ^P ₁ | F ₁ ^P ₂ L ₁ | F ₂ ^P ₂ | | F ₅ ^P ₂ | L ₂ | L ₂ | |
| | AFS | NAVY MILITARY | F ₄ | F ₄ | F ₃ ^P ₁ | | F ₆ ^P ₁ | F ₁ ^P ₁ | F ₂ | |
| | | CIVILIAN | F ₃ ^P ₁ | F ₁ ^P ₂ L ₁ | F ₂ ^P ₂ | | F ₅ ^P ₂ | L ₂ | L ₂ | |
| | AE | NAVY MILITARY | F ₄ | F ₄ | F ₄ ^P ₁ | | F ₇ ^P ₁ | F ₁ ^P ₁ | F ₂ | |
| | | CIVILIAN | F ₃ ^P ₁ | F ₁ ^P ₂ L ₁ | F ₃ ^P ₂ | | F ₆ ^P ₂ | L ₂ | L ₂ | |
| | AO | NAVY MILITARY | F ₄ | F ₄ | F ₃ ^P ₁ | | F ₅ ^P ₂ | F ₁ ^P ₁ | F ₂ | |
| | | CIVILIAN | F ₃ ^P ₁ | F ₁ ^P ₂ L ₁ | F ₂ ^P ₂ | | F ₄ ^P ₃ | L ₂ | L ₂ | |
| MAJOR SUPPORT | AD | NAVY MILITARY | F ₄ | F ₄ | F ₃ ^P ₂ | F ₇ ^P ₂ | | F ₁ ^P ₁ | F ₂ | |
| | | CIVILIAN | F ₄ | F ₁ ^P ₂ L ₁ | F ₃ ^P ₂ | F ₆ ^P ₃ | | L ₂ | L ₂ | |
| | AS | NAVY MILITARY | F ₄ | F ₄ | F ₂ ^P ₂ | F ₇ ^P ₂ | | F ₁ ^P ₁ | F ₂ | |
| | | CIVILIAN | F ₄ | F ₁ ^P ₂ L ₁ | F ₂ ^P ₂ | F ₆ ^P ₃ | | L ₂ | L ₂ | |
| | AR | NAVY MILITARY | F ₄ | F ₄ | F ₄ ^P ₁ | F ₆ ^P ₂ | | F ₁ ^P ₁ | F ₂ | |
| | | CIVILIAN | F ₄ | F ₁ ^P ₂ L ₁ | F ₄ ^P ₁ | F ₅ ^P ₃ | | L ₂ | L ₂ | |

TABLE V-4 (CONT.)

| MISSION | SHIP TYPE | MANNING | PRIMARY | | | | SECONDARY | | | |
|---------------|-----------|----------|-------------------------------|-------------------------------------------------|-------------------------------|-----|-------------------------------|-------------------------------|----------------|-------------------------------|
| | | | MOB | CAC | FSO | NCO | NCO | AAW | SUW | SPW |
| MINOR SUPPORT | ARS | NAVY | F ₄ | F ₄ | F ₁ P ₁ | | F ₆ P ₂ | F ₁ P ₁ | F ₂ | F ₂ P ₁ |
| | | CIVILIAN | F ₄ | F ₁ P ₂ L ₁ | F ₁ P ₁ | | F ₅ P ₃ | L ₂ | L ₂ | F ₂ P ₁ |
| | ASR | NAVY | F ₃ P ₁ | F ₄ | F ₁ | | F ₈ | F ₁ P ₁ | F ₂ | |
| | | CIVILIAN | F ₃ P ₁ | F ₁ P ₂ L ₁ | F ₁ | | F ₇ P ₁ | L ₂ | L ₂ | |
| | ATF | NAVY | F ₄ | F ₄ | F ₁ | | F ₆ P ₂ | F ₁ P ₁ | F ₂ | F ₂ P ₁ |
| | | CIVILIAN | F ₄ | F ₁ P ₂ L ₁ | F ₁ | | F ₅ P ₃ | L ₂ | L ₂ | F ₂ P ₁ |
| | ATS | NAVY | F ₄ | F ₄ | F ₁ | | F ₇ P ₁ | F ₁ P ₁ | F ₂ | F ₃ |
| | | CIVILIAN | F ₄ | F ₁ P ₂ L ₁ | P ₁ P ₁ | | F ₆ P ₂ | L ₂ | L ₂ | F ₃ |

CIVILIAN = Navy Civil Service or Commercial Contract manning

F = Full Capability

P = Partial Capability

L = Lost Capability

NOTE: Subscripts denote the number of ROCs which can be fully or partially performed or which are lost within each mission area.

sector of the maritime industry. This assumption is based on the experience within the MSC with the 17 fleet support ships presently being operated.

2. There is a loss of capabilities in the Command and Control (CAC) mission area for all fleet support ships. A degradation of underway replenishment capability also occurs in the FSO mission area in civilian manned UNREP ships because they man fewer CONREP stations. Since civilian manned ships do not participate in military functions concerned with the defense of ships or task groups, the Combat Information Center (CIC) is not manned. All tactical communications and maneuvers are conducted on the bridge by the watch officer. That is where voice radio, plotting facilities and collision avoidance radar are installed during reconfiguration, if not already in place. The need for retaining a CIC in a civilian manned fleet support ship is greater if a task unit commander is embarked or when fleet support ships are operating in company with task groups. COMSC proposes that all AFS type ships retain CIC facilities in the event the tactical situation envisions the need for a military task unit commander to be embarked in a civilian manned fleet support ship. Both Navy Civil Service and Commercial Contract manned fleet support ships are programmed to retain Navy military communication detachments as a required operational capability in the CAC mission area. An alternative, however, has been proposed by MARAD

which would also substitute civilian radio officers for the communications detachments. This is described in Section IV of this report, but has not been incorporated in this analysis.

E. EFFECTIVENESS OF MLSF SHIPS

1. Underway replenishment ships in the MLSF which are candidates for civilian manning have crew sizes based upon estimates of the minimum number of RAS/FAS/VERTREP stations to be manned for normal UNREP peacetime requirements. All MSC/MARAD manpower proposals for each of the representative ships in the MLSF involve manning fewer stations than required by OPNAV ROC/POE requirements as shown below:

TABLE V-5 COMPARISON OF TOTAL STATIONS MANNED
(VERTREP + RAS + FAS)

| <u>SHIP</u> | <u>NAVY</u> | <u>CIVILIAN</u> |
|-------------|-------------|-----------------|
| AF | 12 | 5 |
| AFS | 6 | 5 |
| AOR | 9 | 6 |
| AOE | 11 | 8 |
| AE | 8 | 5 |
| AO | 8 | 8 |

The fact that MSC/MARAD propose manning fewer stations than Navy military manning raises the issue of reduced capability in the FSO mission area.

2. Fleet underway replenishment in wartime requires the transfer of cargo requirements to customer ships

in a minimum period of time in order to reduce the vulnerability of the ships to attack and to expedite the deployment of forces. This assumes that all receiving ships can accept fuel, munitions and stores at the delivering ship's total delivery capability (amount/station and number of stations).

F. COMPARISON OF AO AND TAO EFFECTIVENESS

An analysis was performed to compare the effectiveness of Navy Military manned fleet oilers (AOs) with Navy Civil Service manned fleet oilers (TAOS). The data used, however, was available only from a limited time period; in one case two months of operations (November 1976 and March 1977) and in the other case one year of operations (April 1976 through March 1977). It is current, but the conclusions drawn must be viewed in the context of this limitation. Another limitation of the data was that it was obtained from ships operating only in the Pacific Ocean while the operating profile for this report is based upon Atlantic Operations. However, the data is useful in helping the decision maker to understand the quantitative differences between the two types of manning. The results of this analysis showed that:

1. In peacetime, Navy Civil Service manned ships are three times more available than Navy Military manned ships and they actually made about 25% more deliveries than their Navy Military manned counterparts.

2. There appears to be no discernable difference between the two types of manning for any measure of effectiveness that could be computed from the data available. The detailed data and computations are shown in Appendix E, Volume III of this report.

G. TRANSITION TO WARTIME STATUS

For peacetime operations MSC and MARAD manpower proposals for UNREP ships provide a 5-8 station manning capability. Offwatch crewmen are used to augment the cargo handling and transfer crews. Navy Civil Service crewed fleet oilers so manned have demonstrated the capability to service the fleet with fuel at the tempo of operations currently scheduled by naval planners. As described in the previous sections, Navy Civil Service fleet oilers are able to sustain this structured OPTEMPO in peacetime over long periods at sea without any degradation of services.

The POE statements for UNREP ships in wartime required that CONREP services are not expected to exceed 20 hours per week for the AF and AFS, and 32 hours per week for the AOE, AOR, AE, and AO type ships in the MLSF. Crew endurance, resulting from increased demands of supplies in wartime could become a significant factor, and must be considered in evaluating wartime efficiency of the MLSF. Navy Military manned MLSF ships are crewed to about 96% SMD manpower levels for peacetime operations and can be augmented in wartime. Hence, a surge in OPTEMPO can be more easily

met by the Navy Military manned ship. There is some question whether a civilian manned ship, crewed in peacetime to be cost effective, can effectively perform at the OPTEMPO of wartime operations. In a developing naval operation in wartime, fuel and munition expenditures could increase rapidly. Back-to-back CONSOLS with station ships, and CONREPS with ships in a Task Group may tax the endurance of a reduced sized civilian UNREP ship crew. Because the SMD manning of Navy UNREP ships provide for personnel for other duties in excess of underway replenishment, the Navy military manned UNREP ship has a manpower pool of relief personnel when the ship engages in a heavy UNREP schedule. By judicious organization and management, all crewmen can quickly become proficient in UNREP operations.

Both MSC and MARAD officials have developed an approach to augment the crews of civilian manned MLSF, if needed. The augmentation will consist of providing additional transfer station teams to be placed aboard as expeditiously as possible. The manpower pool for this will come from the 22% to 120% excess personnel available to the respective civilian option. For deployed UNREP ships, this will require that air transportation be provided. Shipboard accommodations will, by necessity, be doubled up in existing spaces to accept the augment crew. Since this will only happen during hostilities, it is expected that union habitability requirements will be waived in such an event.

A determined enemy threat against naval MLSF forces is one way of constraining naval combat ship operations for lack of fuel and munitions. Thus it is entirely possible that with attrition surviving MLSF ships can expect the OP-TEMPO to exceed most expectations. The endurance of the embarked crews is therefore a significant consideration under these conditions. The ability to provide experienced crewmen at short notice, however, could possibly alleviate this potential problem.

VI. OPERATIONAL RISKS

A. INTRODUCTION

1. The purpose of this section is to assess the factors that constitute potential risk to the effectiveness of the Navy's mobile logistic and support forces, as the result of increased use of civilian manning on fleet support ships.

2. The analysis addresses the following areas of concern to naval planners:

- Military Control
- Stability of the Civilian Work Force
- Manpower Availability
- Legal Implications
- Navy Career Management Implications
- Ship Habitability Impact

B. MILITARY CONTROL

1. Command Authority and Discipline, Navy Military

The U.S. Navy exercises control over its seabased forces through fleet and subordinate commanders of Naval task forces, groups, and units. The authority to control commissioned ships and Naval crews is derived from U.S. Navy Regulations, Department and Fleet Directives. Discipline is directed by the Uniform Code of Military Justice (UCMJ).

2. Command Authority and Discipline, Navy Civil Service

a. The status of fleet support ships changes when civilian crews are substituted for Naval crews. Commissioned (USS) ships thus manned are redesignated "active status, in service" and are called "United States Naval Ship" (USNS). With this new status, the administrative chain of command passes from the Fleet commanders to the Commander, Military Sealift Command (COMSC) who acts for the Chief of Naval Operations in sealift matters. Operational control of USNS fleet support ships remains with the Fleet Commander and his subordinate commanders. MSC ensures that USNS fleet support ships are responsive to the directions of the military commanders whom they support.

b. In the twenty-eight years of MSC's existence, Navy Civil Service manned ships have consistently supported military operations in which they were involved.

c. The Civil Service master of a USNS ship, operating in support of the fleet, is the subject to the orders, regulations, and policies of COMSC, and the MSC area commander having direct administrative control of the ship. Failure of the Civil Service master to comply with such direction can result in disciplinary proceedings under applicable Civil Service personnel regulations.

d. In peacetime, Navy Civil Service mariners, employees of the U.S. Government, are subject to Civil Service Commission regulations and the orders, regulations, and policies of the MSC. The master of a Civil Service

manned fleet support ship has the authority to regulate and discipline members of his crew for specific failures to perform their duties in a satisfactory manner.

e. Navy Civil Service mariners, ashore and afloat, are subject to disciplinary action for violations of MSC orders, regulations, and policies. This is set forth in Civilian Marine Personnel Instruction (CMPI) 750.

f. All USNS ships are issued Ship's Orders which apply to all Civil Service personnel serving aboard. Numerous articles deal with responsibilities, performance of duty, conduct ashore and afloat, and prohibitions. Failure to comply subjects the offender to disciplinary actions appropriate for the offense under the charge "failure to comply with the Ship's Orders". All officers and crew members are directed to comply with the orders.

3. Command Authority and Discipline, Commercial Contract

a. COMSC has limited disciplinary control over the master and crew of a contract-operated ship. In disciplinary cases, MSC must take action through the contractor. However, in wartime, court martial jurisdiction and the entire UCMJ is extended to civilian personnel, by the imposition of 10 U.S.C. Sec 802.

b. A merchant seaman who is referred by his union to crew a fleet support ship for a commercial contractor must sign the "Ship's Articles", whereby he agrees

to work on the ship for a specific voyage, or a specified time, at a certain salary. When his voyage is over, he signs off the ship. His working rules, his tenure of employment, and his benefits are determined by negotiations between his union and the shipping company.

c. Ships Articles govern the conduct of both master and seaman aboard ship and derive their authority from Title 46 U.S. Code, "Shipping". While the intent is to protect the rights of U.S. seamen aboard ships, it has also the force of "Ship's Orders" in describing regulations and prohibitions to which all must adhere for safe and proper operation of the ship.

d. Shipboard discipline measures are addressed in union agreements with companies under contract. These agreements enjoin union members to obey the lawful orders of the ship's master and all supervisory personnel. They also normally provide for the right to appeal disciplinary actions or disagreements between the ship's officers, unlicensed seamen, and the master to a board composed of company and union officials. Since union agreements state that hiring halls must furnish competent, reliable seamen to the ship under contract, the unions endeavor to police their ranks to rid themselves of seamen who have a history of misconduct or incompetence.

e. As in the case of Civil Service manned ships, the maritime record of the U.S. Maritime Service has

been outstanding. In WW II 5625 U.S. Merchant Seamen lost their lives. Of these 4780 were never accounted for. The U.S. Maritime Service's percentage of battle deaths, of those total involved who served, was (2.8%), second only to the U.S. Marine Corps (2.9%).

f. The Coast Guard¹ too, has legal jurisdiction over civilian seamen. Under 46 USC 239 it has jurisdiction to investigate and to take punitive action over licensed or certificated personnel for acts of incompetency or misconduct. Also, under The Magnuson Act, 50 USN Section 191 (b), the President was authorized, if he found "the security of the United States is endangered by...subversive activity", to issue rules and regulations "to safe-guard against destruction, loss or injury from sabotage or other subversive acts" all vessels "in the territories of waters subject to the jurisdiction of the United States". In effect this gives the Commandant of the Coast Guard the right to withhold validation of any permit or license unless he was satisfied that such person's presence on-board would not be inimical to the security of the United States.

4. Compatibility, Military and Civilian Personnel

a. There is concern in some quarters that with the use of commercial contract manning in fleet support ships naval personnel may be persuaded to subscribe to

¹A detailed discussion is contained in a COMSC Counsel Memorandum of Law of 1 December 1977 in Appendix G, Vol III

unionism of the military as a result of their contact with union seamen. While recent events suggest that some military personnel are susceptible to unionism, no evidence exists that would indicate that commercial contract seamen would actively seek to recruit new union members from the military ranks

b. During WW II, Naval detachments were placed on board merchant vessels to man the defensive weapon systems. There is no evidence that during this era either military personnel or civilian seamen purposely attempted to interfere with the work of the other. COMSC advises that today both groups are working and living harmoniously together aboard USNS ships sharing the same accommodations and food.

c. On repair ships and tenders with large military detachments, however, where there would be differences in accommodations, pay scales, and standards of conduct and appearance, discord among military personnel and civilian mariners could conceivably develop.

C. STABILITY OF THE CIVILIAN WORK FORCE

1. Civil Service Crews

The functions performed by crew members aboard the Navy's fleet support ships, and especially the ships in the MLSF, require experience and expertise. Military Sealift Command manpower planners manage the careers of their marine employees through recruitment, training, and

assignments to ships. Navy Civil Service mariners are sent to ships to fill billets for which they are trained and best fitted. Stability on MSC ships is attained by establishing appropriate sea tour lengths, returning seamen to the same or similar type of ships, and providing trained reliefs. Because the MSC mariner is a permanent employee and not a voyage employee, manpower stability and desired performance are attainable on MSC Navy Civil Service manned ships.

2. Commercial Contract Crews

Union hiring hall dispatchers are concerned with crew stability on ships. The union's primary goal is to employ its membership. When job opportunities are plentiful, crews would be stable. However, the decline in U.S.-flag merchant shipping has created a job shortage, thereby causing frequent rotation of seamen in an effort to give each union man at least some employment.

D. MANPOWER AVAILABILITY

1. The Labor Force Today

The availability of licensed officers and unlicensed seamen to man the Navy's fleet support ships is a factor of concern. The U.S. maritime seagoing labor force employs an average of 2.2 seamen ^{1/} to fill each billet aboard U.S.-flag merchant ships. There are presently approximately 24,000 sea billets, providing employment opportunities for approximately 55,000 seamen.

^{1/}Report No. 94-17, Committee on Merchant Marine and Fisheries, Washington, 1977, p. 25.

2. Age Levels

This labor force is composed of relatively older workers. In 1974 the median age of licensed deck and engine officers was 48.5 and 48.7 years, respectively. Comparable figures for unlicensed deck and engine workers were 46.6 and 47.4 years. The median age has remained stable for several years because of a supply of younger men entering the labor force. However, the lack of employment opportunities due to a continuous decline in seagoing jobs is the reason why these young men do not have a full impact upon the age distribution.

3. Future Labor Force

Since 1969, the U.S. Maritime Administration (MARAD) has carried out a series of studies which analyze the future merchant marine officer supply and demand. The latest study^{1/} shows a potential shortage of deck and engine officers by 1980.

4. Manpower Planning

Because ship planning and construction requires several years to put a ship to sea, MARAD sources state that manpower resources can be programmed and trained to meet new ship requirements. Many of the current supply of deck and engine officers are licensed Masters and First Officers, or

^{1/}Merchant Marine Officer Training, 3rd Series, (Draft)
Office of Maritime Manpower, U.S. Maritime Administration

Chief and First Engineers, but occupy lesser billets. As the fleet expands, shortages may occur at the officer entry level. Positions must then be filled by greater training school outputs and the upward shift of personnel. The U.S. Coast Guard has provided relief in the past by allowing otherwise qualified unlicensed personnel to waiver time requirements to advance to Third Officer positions. Also, the Federal, state, and industry supported officer training schools are capable of increasing output to meet demand.

MARAD manpower planners place more concern on the possible shortage of deck and engine licensed officers than unlicensed seamen. Licensed officers are the technical experts aboard merchant ships. The skills to qualify for promotion are achieved after formal education, self-study, experience and time aboard ships. They must pass a comprehensive written examination given by the U.S. Coast Guard before they can be licensed and promoted.

5. Manpower Sources

The sources to fill unlicensed billets in an expanding fleet are not easily identified. Certification at the entry level is sufficient to fill billets requiring only basic skills. A rapidly expanding fleet would require reactivation of U.S. Government and industry supported training schools. MARAD reports that application for admittance exceeds the number that can be admitted. Potential drawdowns of the number of merchant seamen presently in

the seagoing labor force are analyzed in the following discussions of known and possible future requirements.

a. The National Defense Reserve Fleet (NDRF) presently consists of 130 World War II built VICTORY ships and a few more modern SEATRAN class vessels. In a national emergency these ships can be reactivated and put into service in 1 to 3 months. Manpower requirement to man these ships are approximately 1400 licensed officers and 3300 unlicensed seamen.^{1/} A temporary disruption in union hiring hall priorities in order to provide the needed manpower to reactivate NDRF ships is a possibility.

b. The increased need to employ U.S.-flag tankers to transport Alaska oil to the U.S. West Coast is a new requirement (approximately 10 large tankers). Should it become necessary to transport oil to the Gulf Coast of the U.S. via the Panama Canal, a considerable fleet of new tankers would draw upon available manpower resources.

c. It is too early to determine the impact of the foregoing programs on the sea-going labor force. However, union leaders are sensitive to changes in the job market. Since many of the fleet support ships to be employed will have to be reconfigured, the lag of reconfiguration and construction will provide enough time to allow an

^{1/}The ratio of unlicensed seamen to licensed aboard all privately operated cargo ships presently in operation is 2.32. (Source: U.S. Merchant Marine Data Sheet, April 1, 1977, Department of Commerce U.S. Marine Administration). It is assumed each ship will have a minimum of 5 deck and 5 engine officers, and 1 radio officer.

orderly phased expansion of the merchant marine labor force. A new ship construction schedule will allow an orderly phased program of personnel procurement, training, and assignment.

d. The Military Sealift Command is the largest employer of Civil Service mariners within the U.S. Government. Inputs to the ranks of the Civil Service mariners are accepted from merchant seamen and discharged or retired naval personnel. MSC actively recruits former personnel with fleet support ship experience. MSC assists former Navy men to obtain U.S. Coast Guard certification at entry levels commensurate with the highest grade achieved during naval service.

e. MSC Civil Service manned ships employ 602 licensed officers and 1919 unlicensed seamen (4/77) aboard ships now providing services to the Department of Defense. These manpower figures included 22% assigned to the Replacement/Reserve Pools for reassignment, leave, temporary hospitalization and training. The Replacement/Reserve Pool is available to augment immediately the crews of MSC Civil Service ships in an emergency or war.

f. Any expansion of the MSC Fleet Support force will require a larger seagoing labor force of Civil Service mariners. MSC personnel planners predict that the MSC recruitment program can obtain additional seamen at a rate that will suffice to man ex-USS fleet support ships as the Navy makes the ships available to MSC.

g. A planned transfer of ex-USS fleet oilers to MSC for Civil Service manning or commercial contract manning and operation as fleet support ships has been a phased program. The Navy force level planners release selected ships so as not to reduce the deployed and backup ship force levels below an acceptable contingency readiness level. Although the cost analysis in this study has assumed transfers of support ships in FY-79, this assumption was made to provide an economic comparison among the three alternatives. Should a decision be made to replace Navy crews with civilian crews on fleet support ships, a schedule would have to be developed to avoid disruptions to the Navy's fleet support capabilities. A phased program would allow MSC to plan the reconfiguration of the ship for civilian manning, and to recruit and train a crew.

E. LEGAL IMPLICATIONS

1. Introduction

Two potential legal difficulties in the use of commercial contract manning of fleet support ships have been determined from discussions and correspondence with COMSC counsel:^{1/}

a. Contract operation of Government-owned ships to carry out a purely Government function may be prohibited by law.

^{1/} For details see Appendix G

b. Lack of U.S. Coast Guard certification of fleet support ships in the ABS Classification will expose the U.S. Government to increased liabilities for personal injuries under the seaworthiness doctrine.

2. Contract Operations

The Military Sealift Command contracts for operation of its Government-owned tanker fleet. The contractor arrangement for the operation of these vessels is a fixed price. The ship operators assume full responsibility to move government cargo in compliance with MSC movement orders.

a. Contracting for the operation of fleet support ships is, according to COMSC counsel, a different situation.^{1/} Underway replenishment, a method of cargo handling not performed in commercial ship operations, is closely supervised and controlled by Naval task group commanders. The Armed Services Procurement Regulations (ASPR) disallows any contracts that have the appearance of a personal services contract.

b. There is a close employer/employee relationship in which the Navy specifies the qualifications of the contractor's employees, promulgates schedules and assignments upon which the regular hours and overtime depend, and supervises the entire underway replenishment

^{1/}COMSC Counsel Memorandum, "Contract Operation of Fleet Support Ships", dated 2 March 1977. (Appendix G, Vol III)

operation. These appear to reinforce the personal services aspects of commercial contract fleet support ship operations. The legality of fleet support ship operations using commercial contract crews has been raised by COMSC. A judicial review and interpretation of ASPR is beyond the scope of this study, however, the impact of ASPR upon use of commercial contract crews on MLSF ships needs to be further investigated.

3. Certification of Ships

The second legal issue concerns the liability of the U.S. Government with regard to potential lawsuits. These suits may arise from accidents to both commercially operated fleet support ships and their embarked crews, and may involve a lack of U.S. Coast Guard certificability.

a. COMSC advises that the U.S. Navy's fleet support ships that are candidates for commercial contract manning do not comply with the rules for ship construction set by the U.S. Coast Guard and the American Bureau of Shipping (ABS). COMSC advises that the costs to reconfigure ex-USS fleet support ships to meet Coast Guard certification requirements for commercial contract manning and to conform to ABS classification would be prohibitive.^{1/}

b. A Navy Civil Service mariner injured aboard a Civil Service manned fleet support ship can make a claim

^{1/}COMSC Memorandum, M-7/TAM;jij/lak, dated 14 June 1977
(Appendix G)

under the Federal Employees Compensation Act, but his recovery for damages is statutorily defined and limited. On the other hand, should Commercial Contract manning be implemented aboard the non-Coast Guard certified ex-USS fleet support ship, an injured seaman shows that the proximate cause of his injury can be attributed to lack of seaworthiness, i.e., U.S. Coast Guard certification, there is no limit to the damages he may collect.^{1/}

F. NAVY CAREER MANAGEMENT IMPLICATIONS

1. Training Billets

Over 40% of the enlisted billets on board the major fleet support ships are filled by first term enlisted non-rated personnel. Manning these ships with civilians removes training opportunities for naval seamen. Much of the basic training in seamanship aboard fleet support ships prepares many career oriented enlisted personnel for greater opportunities and responsibilities aboard combatant ships. In the event of mobilization some of these trained seamen are available for reassignment to crew ships currently inactive or placed in the active reserve fleet. As the numbers of Navy Military manned fleet support ships decrease through possible replacement by civilian crews, this surge capability is diminished.

^{1/} COMSC Memorandum, M-7/TAM;jij/lak, dated 14 June 1977

2. Command Billets

Fleet support ships provide excellent training opportunities for senior officers. This is especially true for officers destined to command aircraft carriers. The MLSF supports carrier task groups and other combatant forces. The AOE's, AORs, AFSSs, ADs, and AEs provide an excellent indoctrination for commanding officers in gaining major command exposure and experience. If the Navy's fleet support ships were transferred to civilian operation, this could result in a loss of up to 85 command billets.

3. Impact on End strength and Career Force

Loss of personnel billets allocated to each support ship selected for civilian manning could reduce the personnel end strength of the Navy. This reduction in Navy personnel and strength requirements would come at a time when demographic surveys project a 17-21% decline in the number of qualified military applicants during the 1980's as the result of a declining birthrate.^{1/} The civilianization of selected ships could help alleviate this potential problem.

a. The civilian manning concept as described in this study, if fully implemented, results in a net reduction of 6,132 petty officers and 19,327 non-rated personnel. The Navy is currently authorized 63% of its end

^{1/} OPNAV Memorandum "Projected Navy Manpower Impact on Increased Manning of Support Ships", Ser 124E/195842 of 9 November 1977.

strength to fill petty officer billets. A reduction in the Navy's non-rated personnel base is disproportionate to the reduction of petty officers. Assuming a 50% petty officer ratio on auxiliary ships, an arbitrarily imposed maximum rigid top six pay grade (petty officers) ratio, say at the current 63%, then the civilian manning program for support ships would result in a 5% decrease in petty officer manning.

b. Naval planners estimate that the end strength reduction because of civilian manning would result in the need for 33,000 fewer accessions. Based upon 19% of the accessions entering the career force of petty officers, it is projected that 6300 fewer petty officers will be obtained. This is only 200 men more than the decrement (6132) generated by the change to civilian manning of support ships. Thus civilian manning is not deemed by naval planners to be detrimental to military manning provided OSD does not impose a rigid petty officer ratio on the Navy's end strength.^{1/}

4. Impact on Shore Establishment :

OPNAV manpower planners, after having considered the impact of end strength reductions upon shore billets, have determined that a loss of 6000 petty officers, and even a smaller number of career petty officers, the

^{1/} OPNAV Memo previously cited.

26,000 billets lost, would have minimal impact on shore billets. The Navy, already short of shore billets, does not believe that a further reduction would result if civilian manning of fleet support ships were implemented.

G. SHIP HABITABILITY IMPACT

The ship reconfiguration costs submitted by MSC and MARAD provide for improved berthing. However, MSC estimates tend to be higher than the MARAD estimates.

Reporting upon its experience with USNS TALUGA (TAO-62), the first fleet oiler to be transferred to MSC for Navy Civil Service manning, MSC planning engineers provided minimal habitability improvements in order to minimize reconfiguration costs on board a ship which already had over 25 years in service. These minimal habitability improvements were acceptable to Navy Civil Service crewmen embarking upon a new phase in their professional careers. However, MSC found it necessary to improve the habitability standards and ship control features of subsequent fleet oilers transferred to MSC in order to attract and keep seamen who had become experienced in underway replenishment. MSC's higher ship reconfiguration costs result from this experience.

MARAD manpower planners indicate that union leaders are prepared to accept minimal habitability standards in older naval ships. Union leaders are aware that an expensive conversion to a short lived ship in order to provide

better crew accommodations is uneconomical and would possibly remove older ships from any further consideration in civilian manning.

VII. FLEET SUPPORT POLICIES ANALYSIS

A. SUPPORT SHIPS OPERATIONS

The purpose of this section is to identify those areas where the application of civilian manned fleet support ships operations would effect changes to existing fleet policies and practices.

1. Military Sealift Command Role

The Commanders, Surface Forces, subordinate commands of both the Atlantic and Pacific Fleet Commanders in Chief are responsible for the administration and management of the fleet support ship forces. These responsibilities entail personnel, material and training readiness. Fleet support ships are allocated to the numbered fleet commanders for operational control; these fleet commanders employ them in support of the combat forces.

A CNO decision in the early seventies directed the transfer of selected fleet support ships to MSC for designation as USNS ships for Navy Civil Service manning under the Charger Log II program. The administration and management of the Civil Service manned fleet support ships was shifted to the Commander, Military Sealift Command (COMSC), vice the Commanders, Surface Forces. The MSC is commanded by a Navy Flag Officer and staffed with both Navy and civilian shipping experts. It is also a participant in the Naval Communications world-wide network.

COMSC recruits, trains, and allocates Civil Service mariners to its fleet support ships force. COMSC has also assumed the full responsibility for the maintenance and overhaul of the civilian manned fleet support ships that are allocated to the FLTCINCs and subordinate commanders to conform to an agreed schedule of services and deployments. The administration and management remains in the hands of COMSC; Operational Control (OPCON) passes back and forth between the FLTCINCs and COMSC as the ships are made available for services, or reverts to COMSC for programmed maintenance, or other reasons.

2. Civilian Manned Ship Contract Agency

Should a decision be made to contract with the commercial maritime industry to operate ex-USS fleet support ships, an authorized contracting and management agency for these expanded services would be required. It is assumed that MSC, as cognizant Department of Defense Transportation Operating Agency (TOA) for ocean shipping, would be that agency.

B. COMMUNICATIONS

1. A Civilian manned fleet support ship will be required to perform the following communications functions over a 24 hour day, using the same communications systems that are used on Navy military manned support ships:

- Provide command and control communication facilities to support a naval task

organization commander and staff when embarked.

- Maintain visual communications
- Maintain uncovered radio teletype continuous wave (RATT/CW) communications
- Maintain multichannel cryptographically covered RATT/CW communications
- Process communications message traffic
- Carry out organizational level maintenance on installed communication equipments

The volume and coverage of naval communications will vary depending upon the ship's mission and tasks.

2. Mission areas, task assignments, installed equipment, communication space allocation and arrangement are all factors that determine the manning level in fleet support ships. According to the Navy, the minimum number of communication personnel aboard a major fleet support ship is:

- 1 Supervisor (classified material custodian) on call 24 hours
- 6 Watchstanders (Signalmen/Radiomen) 3 section watch
- 2 Repairmen, on call

These are minimum requirements. Augmentation may be required when the tempo of operations increases. When visual communication watches are not continuous, signalmen may be

placed on call or used to assist the watch radiomen in message center duties.

3. On the ships manned by Navy Civil Service crews, the communication departments are manned by a naval communication detachment. The Navy military detachment is headed by an officer-in-charge who is assisted by enlisted radiomen and signalmen in providing the ship with a full naval communication capability.

4. It must be noted that duty for military detachments embarked on civilian manned ships represents a changed environment from that experienced on USS ships. Navy personnel, except those assigned to tenders and repair ships, would share the same habitability standards afforded the civilian crewmen. Differences in pay scales, especially during periods of arduous duties, between civilian and naval seamen working side-by-side may be a distraction for some.

5. MARAD has suggested that all communication functions including crypto could be performed by commercial contract personnel. An analysis of this possibility is included in Section IV of this volume. If this approach were to be adopted, all the policy relating to communication station manning would require revision.

C. SELF DEFENSE

In the reconfiguration of fleet support ships to peacetime civilian operation, all defense systems are

removed. Therefore, plans for civilian manned ship deployment in war or a hostile environment should include provisions for naval escort and/or provision for the addition of modular defensive weapon systems.

D. MAINTENANCE

1. Support Facilities

The responsibility for maintenance, repair, and overhaul of civilian manned fleet support ships would rest with COMSC for Navy Civil Service operated ships, and with the contractor for contract operated ships. Both MSC and contract operators use commercial facilities. MSC has access to Navy repair and shipyard facilities, but seldom relies upon these activities for routine repairs.

2. Agent Availability

Since fleet support ships are more likely to be operating from and near military installations, local agents may not be available and assistance by the military for contract operated fleet support ships would be inappropriate. However, the local MSC office and staff could provide the service. The MSC has estimated a 4% fee for managing the proposed contract operation vice a 5% overhead to fund its own ship operations. It appears that this 4% fee would compensate for all services rendered to its contractors in this instance.

3. Merchant Marine Practice

Following merchant marine practice, MSC and contract operators require all shipboard maintenance to be performed by the embarked crew. Approximately once in two years, the ship is dry docked for hull cleaning and overhaul of propellers, shafting, sea chest, etc. U.S. Coast Guard and classification society (ABS) inspections may also be scheduled at this time.

E. TRAINING

1. MSC Current Practice

MSC has developed a comprehensive training program for its personnel who operate fleet support ships. Training is given in three phases, and is geared to schedules for activation of ships assigned. Initially, training is provided by Navy activities in ship handling and technical aspects of the intended operation, such as fire-fighting and damage control. Civil Service seamen are also assigned to sail as observers aboard Navy ships. In the second phase, when the crew is assigned to the ship, they are involved in training operations at sea under the observation of skilled Navy instructors. Finally, during ship qualification trials, the ships take part in underway exercises where the crew handles all functions which would be performed in an actual operation, again observed by skilled Navy instructors.

While MSC might be capable of training more seamen aboard MSC ships, there would be nonetheless a requirement to use Navy shore training facilities, i.e., ship handling trainers, fire fighting and damage control school, etc. Moreover, the services of the Navy's Fleet Training Groups (FTG) would be required to continue training MSC ships and crews, and to evaluate the performance of contract operated fleet support ships, if this option is exercised by naval planners.

2. Maritime Administration Approach

MARAD advises that contract operators are prepared to establish training courses at the industry/union supported training facilities for licensed and unlicensed personnel. In the beginning, the use of Navy instructors would be most helpful at these schools. Visits to USN fleet support ships to observe fleet support ship operations would be helpful to the indoctrination and training of civilian contract personnel. Here also the FTG should be available to evaluate the crew and ship prior to assignment to fleet support operations.

VIII. REDUCED OPERATING STATUS ANALYSIS (ROS)

A. INTRODUCTION

1. The productivity findings of this study indicate that there will be an excess of capacity of MLSF ships during peacetime for fleet support if certain civilian manning options are selected. To utilize the increased productivity possible with peacetime civilian manning and yet retain the capability to deploy MLSF forces on short notice in the event of a contingency or war, suggests the assignment of excess ships in peacetime to a Reduced Operating Status (ROS) at U.S. Naval bases and facilities.

These ships would remain at pierside for extended periods of time. A detailed analysis of this concept is provided in Appendix F.

2. The ships selected for ROS would have all cargo removed ashore in order to avoid the shelf life problems associated with cargo storage aboard ship and the costs associated with cargo management. A minimum ship keeping crew is required to be placed on board to maintain the hull and equipment and provide internal security for the vessel. The required crew to maintain these ships and augment the crew have been identified by MSC and MARAD and they have also identified the cost of developing and implementing the ROS program. Two cases of ROS were examined; one case assumed that 12 ships (2 AF, 6 AE and 4 AO) would be placed in an ROS status and the other that 6 ships (2 AFSS, 3 AEs,

and 1 AO) would be so assigned. The mix of ships and this deployment are described in Tables F-1 and F-2 in Appendix F, Volume III. The first case requires that 36 UNREP ships (7 AFS, 13 AE, 16 AO) be civilian manned (either Navy Civil Service or Commercial Contract) and the second case assumes a mix of Navy Military Manning and Navy Civil Service or Commercial Contract manning (USN: 3 AFS, 8 AE, and 8 AO, Civilian: 4 AFS, 5 AE, 8 AO).

3. The analysis performed was to determine cost savings and operational benefits that might be achieved by placing civilian manned MLSF ships in ROS with the ability to return these ships to a Full Operational Status (FOS) in the time prescribed by Naval Planners.

4. Certain requirements for maintenance and responsiveness were prescribed and both MSC and MARAD priced out the options and developed their manpower requirements. Briefly the ships were to be reactivated in 10, 20 and 30 days from ROS to Full Operating Status (FOS) and the ship keeping requirements were as follows:

- a. Machinery placed in a "cold iron, but
"wet" status
- b. Hull, internal and external
compartments to be routinely cleaned and
preserved.
- c. UNREP gear to be maintained
- d. Ship control equipment to be tested and
repaired.

- e. Communications equipment to be tested and repaired.
- f. Maintenance records to be prepared and maintained
- g. Propulsion and auxiliary equipment to be cleaned and preserved.
- h. Periodic checks, tests and trials of machinery and equipment to be carried out and corrective maintenance to be performed when necessary.
- i. Ship's repair parts and stores to be maintained on board
- j. Ship's supply records to be maintained in accordance with Supply regulations
- k. Shipkeeping and maintenance crew to be identified
- l. Additional personnel resources required for reactivation identified
- m. Shipboard and Shore training of crews to be accomplished

In addition, the same military detachments needed for FOS were to be made available by the Navy. The same representative ships, i.e., AFS-3, AE-28 and AO-177 were analyzed. The AOE and AOR were not considered candidates for ROS.

B. NAVY CIVIL SERVICE MANNED ROS ASSUMPTIONS

1. The MSC provided the data and costs for the two ROS cases. In providing this data they assumed the following:

a. The AE would be maintained in ROS at Earle, New Jersey.

b. The AFS and AO would be maintained in ROS at Norfolk, Virginia. (As mentioned earlier, all costs in this study were assumed to be Atlantic Fleet costs.)

c. The maintenance and repair estimates do not include overhaul. The conversions and overhaul would be completed on all ships prior to their going into ROS.

d. The cost estimates include hotel services aboard the ships in ROS.

2. The initial specification submitted to the Military Sealift Command and the Maritime Administration for the provision of cost estimates recommended that a one day sea trial be performed annually for each of the ships placed in ROS status. Originally the intention was that the ships would be placed in ROS status for two years and tested once a year in order to assure their readiness for sea and their ability to support the Fleet. Both the Military Sealift Command and the Maritime Administration, however, recommended against this procedure. These requirements were not considered as providing the least cost alternative for placing the ships in ROS status. Instead both organizations

recommended that the ships be placed in ROS status and brought out for actual operation every second year. This reduces the operating costs of the ship in that the ROS ships are charged for deactivation at the beginning of one year and activation the start of the next year. Instead of operating or being tested on a one day sea trial, the ship is tested in actual operation for a full year.

A preliminary cost analysis was performed based on the one day sea trial requirements and is shown on Figure F-1, Appendix F Volume III. It clearly showed that a one-day sea trial every year and a two year ROS cycle was not the most cost effective.

The Maritime Administration and the Military Sealift Command also recommended an additional plan--an unmanned lay-up alternative. This choice would be useful where the condition of excess ship capability could be expected to extend over a number of years. This lay-up alternative results in the deactivation of the ship and maintaining the ship without any permanent on-board personnel. This alternative increases the risk associated with the availability of trained crews. MARAD estimated these cost of lay-ups as shown in Table VIII-1. No further analysis was performed on this alternative because it was not considered responsive to Navy requirements. The cost shown included periodic checks and test of machinery and equipment to be carried out in accordance with technical manuals

TABLE VIII-1
UNMANNED LAY-UP COSTS^{1/}

Fleet Oiler (AO-177)

| | |
|-------------------------------|------------|
| Deactivate and Reactivate | \$ 965,000 |
| Maintain in Lay-up (per year) | \$ 80,000 |

Combat Stores Ship (AFS-3)

| | |
|-------------------------------|-------------|
| Deactivate and Reactivate | \$1,090,000 |
| Maintain in Lay-up (per year) | \$ 135,000 |

Ammunition Ship (AE 28)

| | |
|-------------------------------|-------------|
| Deactivate and Reactivate | \$1,600,000 |
| Maintain in Lay-up (per year) | \$ 140,000 |

^{1/} These costs were provided by the MARITIME ADMINISTRATION and are shown for information only.

and standard merchant marine practices. Sea trials of one day duration were included in the cost of reactivation.

C. COMMERCIAL CONTRACT MANNING (ROS) ASSUMPTIONS

1. The Maritime Administration indicated that the cost to achieve RFS status in 10 days would not be greater than that required for the 20 or 30 day RFS capability. Therefore, only one set of calculations was required for the commercial contract manning ROS analysis.

2. Due to the concern for the availability of trained crews, ROS status required that there be active ships of the same or similar type operating with crews drawn from the civilian workforce.

3. ROS ships with shipkeeping crews on board were assumed to be used as training bases for civilian seafarers to qualify them for service from operating ships.

4. All ships delivered for ROS status were assumed to have been overhauled prior to delivery for ROS status. The costs provided by the MARAD were based on shore supplied steam, electricity and water. It was further assumed that the interior would be maintained at a level commensurate with habitability and work related needs.

Practical training evolution concerned with the operation of UNREP equipment were incorporated into the exercise and maintenance schedule. The basic shipkeeping crew was assumed to work on an 0800 to 1700 normal work day.

5. The costs for maintenance and preservation were not provided by the MARAD. Instead they recommended using the costs developed by MSC.

6. A two man security detail consisting of a gangway watch and a roving fire safety watch was planned for the hours from 1600 to 2400 and 2400 to 0800 on normal working days and a 24 hour day (three watches) on weekends and holidays.

7. The steward department was assumed to provide meals and quarters.

8. The services of a qualified radio electronics officer (REO) was assumed to be required on a roving basis to insure maintenance of radio communications equipment and radio electronic navigation equipment at full operational capability. Depending on the location of the ships, one REO can handle up to six ships depending on their location.

9. Contributions to industry training funds were included in the costs of active seafarers both in operational ships and the ROS ships. Therefore, no incremental costs of the onboard subsistence were projected for the training operation.

10. The ships were assumed to maintain heating and ventilation systems in fully operational status as they would at sea. It was also assumed they would be periodically pressure tested and fired up.

D. MANPOWER REQUIREMENTS

Table VIII-2 displays the manpower requirements for the civilian crews for the AFS, AO, and AE respectively. In order to simplify the comparison, the column labeled FOS (full operating status) shows the number of civilian personnel required compared to the RFS 10, 20, and 30 days.

The military detachment requirements are not known and they are assumed constant for all the alternatives. In the case of the Navy Civil Service personnel, the Military Sealift Command indicated that there is no difference in personnel required for an FOS 20 and FOS 30 case. For the commercial contract manning case, the manpower required for the FOS 10, 20 and 30 day case is identical.

E. RESULTS OF COST ANALYSIS

The cost analysis includes the ROS manpower, subsistence, fuel, and revised maintenance and repair costs. The results are shown on Tables VIII-3, VIII-4 and VIII-5. A total of 36 UNREP ships were analyzed. This mix of ships comprised 2 AFS, 13 AE, 8 AO, and 8 TAO. These ships are presently operated by Navy military personnel. If these ships were transferred to Navy Civil Service Manning, the FYDP savings would be \$888,170 m as shown in Table VIII-3 and \$746,093 m if converted to Commercial Contract manning as shown in Table VIII-4. If in addition 12 ships were placed in ROS (10 days FOS) there could be an additional FYDP savings of \$207,216 m or \$310,730 m respectively. In the

TABLE VIII-2
ROS MANPOWER REQUIREMENTS

| <u>Ship Type</u> | <u>Navy Civil Service</u> | | | <u>Commercial Contract</u> | |
|------------------|---------------------------|---------------|------------------|----------------------------|---------------------|
| | <u>FOS</u> | <u>FOS-10</u> | <u>FOS-20/30</u> | <u>FOS</u> | <u>FOS-10/20/30</u> |
| AFS | 125 | 57 | 46 | 148 | 34 |
| AO | 89 | 41 | 33 | 84 | 31 |
| AE | 121 | 56 | 45 | 117 | 33 |

The military detachment requirements are not shown and they are assumed constant for all the alternatives. In the case of the Navy civil service personnel, the Military Sealift Command indicated that there is no difference in personnel required for an FOS 20 and FOS 30 case. For the commercial contract manning case, the manpower required for the FOS 10, 20 and 30 day case is identical.

TABLE VIII-3

FYDP COST COMPARISONS - (FY 79-83)
(\$000 Current Year \$)

Navy Civil Service Manning Options

CASE I

| | |
|---------------------------------------------------------------------------|-----------|
| 1) All Navy Military Manned except 8 TAO (7 AFS, 13 AE, 8 AO) | 2,359,104 |
| 2) All Civil Service Manned (7 AFS, 13 AE, 16 AO) | 1,470,934 |
| 3) Savings in UNREP fleet due to Civil Service Manning (Row 1 - Row 2) | 888,170 |
| 4) Additional savings due to placing 12 ships in ROS - 10 days FOS | 207,216 |
| 5) Additional savings due to placing 12 ships in ROS - 20/30 days FOS | 222,728 |

CASE II

| | |
|----------------------------------------------------------------------------------------------|-----------|
| 6) 3 AFS, 8 AE, 8 AO Navy Military Manned, 4 AFS, 5 AE, 8 AO Navy Civil Service Manned | 2,094,963 |
| 7) Savings due to the transfer of ships to Civil Service Manning (Row 1 - Row 6) | 264,145 |
| 8) Additional savings due to placing 6 ships in ROS - 10 days FOS | 108,956 |
| 9) Additional savings due to placing 6 ships in ROS - 20/30 days FOS | 138,417 |

TABLE VIII-4

FYDP COST COMPARISONS - (FY 79-83)
(\$000 Current Year \$)

Commercial Contract Manning

CASE I

| | |
|------------------------------------------------------------------------------------|-----------|
| 1) All Navy Military Manned except 8 TAO (7 AFS, 13 AE, 8 AO) | 2,359,104 |
| 2) All Commercial Contract Manned (7 AFS, 13 AE, 16 AO) | 1,613,011 |
| 3) Savings in UNREP fleet due to Commercial Contract Manning (Row 1 - Row 2) | 746,093 |
| 4) Additional savings due to placing 12 ships in ROS 10/20/30 days FOS | 310,730 |

CASE II

| | |
|---------------------------------------------------------------------------------------------------|-----------|
| 5) 3 AFS, 8 AE, 8 AO Navy Military Manned, 4 AFS, 5 AE and 8 AO Commercial Contract Manned | 2,160,647 |
| 6) Savings in UNREP Fleet due to Selected Ships Commercial Contract Manning (Row 1 - Row 5) | 194,458 |
| 7) Additional savings due to placing 6 ships in ROS 10/20/30 days FOS | 161,458 |

TABLE VIII-5

UNDISCOUNTED ECONOMIC COST COMPARISONS
CIVILIAN MANNING - CASE I and CASE II
(\$000 FY 77)

| | CASE I | | | CASE II | | |
|---------------------------------------------------------------------------------------------------|----------------------|--------------------------|----------------------|----------------------|--------------------------|----------------------|
| | Navy Civil Service | | Commercial Contract | Navy Civil Service | | Commercial Contract |
| | DOD Per Year Cost | US GOVT Per Year Cost | DOD Per Year Cost | DOD Per Year Cost | US GOVT Per Year Cost | DOD Per Year Cost |
| 1) All Navy Military Manned except 8 TAO (present) | 328,874 | 333,011 | 328,874 | 328,874 | 333,011 | 333,011 |
| 2) 7 AFS, 13 AE, 16 AO Civilian Manned | 224,775 | 225,222 | 269,316 | 224,775 | 225,222 | 269,866 |
| 3) Difference between present operations and all civilian manning (Row 1 - Row 2) | 104,099 | 107,779 | 59,558 | 104,099 | 107,779 | 63,135 |
| 4) 12 Ships 10 days FOS | 182,243 | 182,690 | 212,236 | 182,243 | 182,690 | 212,786 |
| 5) Additional Savings due to placing 12 ships in ROS (Row 2 - Row 4) | 42,532 | 42,532 | 57,080 | 42,532 | 42,532 | 57,080 |
| 6) 12 Ships 20/30 days ROS | 179,047 | 179,496 | 212,236 | 179,047 | 179,496 | 212,786 |
| 7) Additional Savings due to placing 12 ships in ROS (Row 2 - Row 6) | 45,728 | 45,726 | 57,080 | 45,728 | 45,726 | 57,080 |
| 8) 3 AFS, 8 AE, 8AO Navy Military Manned, 4 AFS, 5 AE, 8 AO Civilian Manned | 295,176 | 297,880 | 316,663 | 295,176 | 297,880 | 319,416 |
| 9) Difference between present Operations and Case II (Row 1 - Row 8) | 33,698 | 35,115 | 12,211 | 33,698 | 35,115 | 13,585 |
| 10) 6 Ships 10 days FOS | 275,317 | 276,027 | 286,025 | 275,317 | 276,027 | 288,778 |
| 11) Additional Savings due to placing 6 ships in ROS 10 days RFS (Row 8 - Row 10) | 21,859 | 21,859 | 30,638 | 21,859 | 21,859 | 30,638 |
| 12) 6 Ships 20/30 days FOS | 271,657 | 274,366 | 286,025 | 271,657 | 274,366 | 288,778 |
| 13) Additional savings due to placing 6 ships in ROS 20/30 days FOS (Row 8 minus Row 12) | 23,522 | 23,528 | 30,638 | 23,522 | 23,528 | 30,638 |

case of Navy Civil Service manning, by extending re-sponsetime (20/30 days FOS), the savings would be \$222,728 instead of \$207,216 m. As described earlier in this section, an additional mix of UNREP ships; i.e., 19 ships Navy Military manned and 17 ships civilian manned was also investigated. Since fewer ships are military manned, the total number of ships are less productive in peacetime and thus only 6 ships could be placed in ROS. The results of this FYDP cost Analysis are shown under Case II on Tables VIII-3 and VIII-4.

Table VIII-4 displays the undiscounted average annual economic costs of converting selected UNREP ships to civilian manning and then placing some of them in a Reduced Operating Status. In case I (12 ships ROS--36 ships civilian manned) the possible annual reduction in economic DOD cost is \$146,631 m and \$159,827 m (depending on response time) in the case of Navy Civil Service Manning. In Case II (6 ships ROS, 17 civilian manned) the possible annual reduction in economic DOD cost is \$55,457 m (for 10 days response time) and \$56,220 m (for 20/30 days response time) if Navy Civil Service manned and \$44,228 m if commercial contract manned. An additional savings, although not out of pocket, will be the extended life of the UNREP Ships. Because of unknown obsolescence dates, no attempt was made to quantify that reduction in cost.

IX. SUMMARY OF FINDINGS

A. TOTAL FORCE MANPOWER CONSIDERATIONS

Following is a brief review of the findings of this report. As indicated in the introduction, no recommendations are proposed. The findings are documented in this report and summarized in this section. It will require the decision makers to apply the necessary military, national security and economic considerations in determining the direction and scope of further action.

1. Navy Personnel

a. One of the possible benefits that can be derived from the expanded implementation of the civilian manning concept is the reduction in the number of military personnel currently required for support ship operations. Increased civilian manning of support ships would release skilled ratings for reassignment to the combatant forces, where shortages exist in the critical rates and ratings. However, as civilians replace naval personnel, the (authorized) end strength of the Navy would probably be reduced.

b. The number of Navy military personnel who would be released for reassignment as a result of expansion of the civilian manning concept across the current Fleet Support Ship Force is the difference between current military manning levels and the number of military personnel

required to man military detachments. Table IX-1 shows the total SMD authorized manning levels of the active support fleet by ship type. It also shows the number of personnel required to man military detachments if this force would be completely manned under the Navy Civil Service or Commercial Contract manning alternatives. The delta columns show the number of military personnel that would be reassigned if the civilian manning alternatives were utilized to man the active support fleet. All computations have omitted the possibility of substituting civilians for the Navy military communications detachments.

2. New Civilian Billets

a. Expansion of the civilian manning concept across the entire active support force would create a large number of new civilian billets in the government sector for the case of the Navy Civil Service manning alternative, and in the private sector for the case of the Commercial Contract manning alternative. For either alternative, the most likely source of personnel to fill these billets would be the maritime union ranks. Table IX-2 shows the number of new civilian billets which would be required to be filled under each of the civilian manning alternatives for operation of the support fleet. Also shown are the number of personnel required to fill these billets.

b. In the Navy Civil Service manning case, the number of billets has been multiplied by a factor of 1.2 to

TABLE IX-1 CHANGE IN NAVY BILLET REQUIREMENTS

| MISSION AREA | SHIP TYPE | BILLET REQUIREMENTS | | | | | | | | | | | | | | | | | | △ | | | | | |
|--------------|-----------|-----------------------|------|--------|--------|-----|------|-------------------------------------------------|--------|-----|------|--------|--------|-----|------|--------|--------|-----|------|--------------------------------------------------|--------|---|------|---|-------|
| | | NAVY MILITARY MANNING | | | | | | MILITARY DETACHMENT, NAVY CIVIL SERVICE MANNING | | | | | | △ | | | | | | MILITARY DETACHMENT, COMMERCIAL CONTRACT MANNING | | | | | |
| | | O | W.O. | E | TOTAL | O | W.O. | E | TOTAL | O | W.O. | E | TOTAL | O | W.O. | E | TOTAL | O | W.O. | E | TOTAL | O | W.O. | E | TOTAL |
| UNREP | AF | 11 | 3 | 236 | 250 | 1 | 0 | 17 | 18 | 10 | 3 | 219 | 232 | 3 | 0 | 24 | 27 | 8 | 3 | 212 | 223 | | | | |
| | AFS | 140 | 28 | 2,901 | 3,129 | 7 | 0 | 308 | 315 | 133 | 28 | 2,653 | 2,814 | 21 | 7 | 357 | 385 | 119 | 21 | 2,604 | 2,744 | | | | |
| | AGR | 119 | 14 | 2,793 | 2,926 | 7 | 0 | 196 | 203 | 112 | 14 | 2,597 | 2,723 | 21 | 0 | 203 | 224 | 98 | 14 | 2,590 | 2,702 | | | | |
| | AOE | 68 | 24 | 2,180 | 2,272 | 8 | 4 | 148 | 160 | 60 | 20 | 2,032 | 2,112 | 16 | 4 | 176 | 196 | 52 | 20 | 2,004 | 2,076 | | | | |
| | AE | 156 | 65 | 4,745 | 4,966 | 26 | 13 | 312 | 351 | 130 | 52 | 4,443 | 4,615 | 52 | 13 | 468 | 533 | 104 | 52 | 4,277 | 4,433 | | | | |
| | AO | 144 | 32 | 2,752 | 2,928 | 16 | 0 | 288 | 304 | 128 | 32 | 2,464 | 2,624 | 32 | 0 | 272 | 304 | 112 | 32 | 2,480 | 2,624 | | | | |
| | TOTAL | 638 | 166 | 15,667 | 16,471 | 65 | 17 | 1,269 | 1,351 | 573 | 149 | 14,398 | 15,120 | 145 | 24 | 1,500 | 1,669 | 493 | 142 | 14,167 | 14,802 | | | | |
| | AD | 189 | 108 | 10,278 | 10,575 | 126 | 72 | 6,156 | 6,354 | 63 | 36 | 4,122 | 4,221 | 126 | 72 | 6,156 | 6,354 | 63 | 36 | 4,122 | 4,221 | | | | |
| | AS | 360 | 156 | 13,224 | 13,740 | 264 | 96 | 9,048 | 9,408 | 96 | 60 | 4,176 | 4,332 | 264 | 96 | 9,048 | 9,408 | 96 | 60 | 4,176 | 4,332 | | | | |
| | AR | 72 | 32 | 2,668 | 2,772 | 40 | 24 | 1,392 | 1,456 | 32 | 8 | 1,276 | 1,316 | 40 | 24 | 1,392 | 1,456 | 32 | 8 | 1,276 | 1,316 | | | | |
| REPAIR | TOTAL | 621 | 296 | 26,170 | 27,087 | 430 | 192 | 16,596 | 17,218 | 191 | 104 | 9,574 | 9,869 | 430 | 192 | 16,596 | 17,218 | 191 | 104 | 9,574 | 9,869 | | | | |
| | AKS | 24 | 12 | 588 | 624 | 0 | 0 | 36 | 36 | 24 | 12 | 552 | 588 | 0 | 0 | 48 | 48 | 24 | 12 | 540 | 576 | | | | |
| | ASR | 42 | 12 | 1,200 | 1,254 | 12 | 0 | 162 | 174 | 30 | 12 | 1,038 | 1,080 | 12 | 0 | 156 | 168 | 30 | 12 | 1,044 | 1,086 | | | | |
| | ATF | 14 | 14 | 301 | 329 | 0 | 0 | 28 | 28 | 14 | 14 | 273 | 301 | 0 | 0 | 70 | 70 | 14 | 14 | 231 | 259 | | | | |
| | ATS | 18 | 3 | 381 | 402 | 3 | 0 | 39 | 42 | 15 | 3 | 342 | 360 | 3 | 0 | 42 | 45 | 15 | 3 | 339 | 357 | | | | |
| SERVICE | TOTAL | 98 | 41 | 2,470 | 2,609 | 15 | 0 | 265 | 280 | 83 | 41 | 2,205 | 2,329 | 15 | 0 | 316 | 331 | 83 | 41 | 2,154 | 2,273 | | | | |
| | ALL | 1,357 | 503 | 44,307 | 46,167 | 510 | 209 | 18,130 | 18,849 | 847 | 294 | 26,177 | 27,318 | 590 | 216 | 18,412 | 19,218 | 767 | 287 | 25,895 | 26,949 | | | | |

O = OFFICER PERSONAL
W.O. = WARRANT OFFICER PERSONAL
E = ENLISTED PERSONAL

TABLE IX - 2
CIVILIAN BILLETS AND PERSONNEL REQUIRED
TO MAN THE ACTIVE SUPPORT FLEET

| TYPE SHIP | NAVY CIVIL SERVICE MANNING | | | | | | COMMERCIAL CONTRACT MANNING | | | | | |
|--------------|----------------------------|-----------|--|------------|-----------|--|-----------------------------|-----------|--|----------|-----------|--------|
| | LICENSED | | | UNLICENSED | | | TOTAL | | | LICENSED | | |
| | BILLETS | PERSONNEL | | BILLETS | PERSONNEL | | BILLETS | PERSONNEL | | BILLETS | PERSONNEL | |
| UNREP | 708 | 850 | | 4,718 | 5,662 | | 5,426 | 6,512 | | 811 | 1,784 | |
| | | | | | | | | | | 4,894 | 10,767 | |
| | | | | | | | | | | | | 12,551 |
| REPAIR | 316 | 379 | | 3,359 | 4,031 | | 3,675 | 4,410 | | 433 | 953 | |
| | | | | | | | | | | 2,565 | 5,643 | |
| | | | | | | | | | | | | 6,596 |
| SERVICE | 178 | 214 | | 540 | 648 | | 718 | 862 | | 200 | 440 | |
| | | | | | | | | | | 458 | 1,008 | |
| | | | | | | | | | | | | 1,448 |
| ALL | 1,202 | 1,443 | | 8,617 | 10,341 | | 9,819 | 11,783 | | 1,444 | 3,177 | |
| | | | | | | | | | | 7,917 | 17,418 | |
| | | | | | | | | | | | | 20,595 |
| | | | | | | | | | | 9,361 | | |

arrive at total annual personnel requirements. This factor represents the 20% additional personnel over actual billets maintained by MSC to cover vacations, illnesses, training and other personnel down time.

3. Commercial Contract Billets

a. In the Navy Civil Service manning case, the number of billets has been multiplied by a factor of 1.2 to arrive at total annual personnel requirements. This factor accommodates the current union practice of requiring only an average tour of six months aboard ship. Thus, two seamen are required to man each billet for one year. The remaining portion of this factor (two-tenths) represent the additional manpower required to cover personnel down time.

B. OPERATING COST IMPLICATIONS

1. The estimates of the total FYDP cost of ship operations for each of the manning alternatives, shown in Table IV-6, demonstrate the short run funding impact of the expanded implementation of the civilian manning concept. However, to understand the long run economic impact of selecting either the Navy Civil Service or the Commercial Contract manning alternative for expanded utilization for fleet support operations, it is necessary to compare the undiscounted economic cost estimates which are projected for a thirty year period (1979-2008). These are displayed in Table IV-7.

2. For every ship type studied, cost savings may be expected from the increased implementation of either the Navy Civil Service or the Commercial Contract manning alternative. This result reflects the fact that current Navy military crews are larger than those projected for either of the civilian manning alternatives. It further reflects the expense of military manpower, when evaluated from a total resource point of view as opposed to a budgetary viewpoint. In addition, the maintenance and overhaul procedures practiced by the civilian maritime industry results in additional annual cost savings.

3. For every ship type studied, the Navy Civil Service manning alternative provides greater cost savings than the Commercial Contract alternative. Analysis shows that the cost of vacations and of retirement for Civil Service personnel is substantially lower than for their industrial counterparts, and that these two areas generate the large majority of these additional savings.

4. Although the estimates of the costs of ship reconfiguration for civilian manning provided by MARAD are considerably lower than those provided by MSC, the differences constitute only a small change in total cost when averaged across thirty years. The large difference in the estimates of reconfiguration costs are not significant when allocated over thirty years.

C. MISSION FULFILLMENT CAPABILITIES

1. There is a loss of capability in the fleet Command and Control (CAC) mission area because of the elimination of the Combat Information Center (CIC) from civilian manned Fleet MLSF ships.

2. Civilian manned ships do not provide as many replenishment stations as do Navy military manned ships. In wartime both civilian manned options can provide additional personnel to augment the present crew.

3. Self Defense capability would be lost because civilians as non-combatants would not be capable of Anti-Air Warfare, Surface Warfare and Special Warfare.

D. OPERATIONAL RISKS

1. Military Control

Experience to date, based on ships already being operated by MSC indicates that the risk of control of the crew is minimal. Wartime experience has demonstrated the reliability of both Navy Civil Service and Commercial Contract manning. There is little to suggest that this tradition would not continue in the future. It should be noted, however, in the case of Commercial Contract manning there is, at this time, no procedure for taking any direct disciplinary action against master or crew in peacetime. MSC, as the contract manager, can only deal through the contractor in these matters. This is considered a potential hazard for any military contingency.

2. Stability of Workforce

The MSC has a policy of striving for crew stability by establishing appropriate sea tour lengths, returning seamen to same or similar ships and providing trained reliefs. In the case of the Commercial Contract crews, the Unions appear capable of providing stability of assignment.

3. Manpower Availability

Currently the supply of manpower is adequate. However, past studies made by MARAD indicated a trend toward a shortage of civilian deck and engine officers by 1980. Nonetheless, both MARAD and MSC indicate that with proper advance planning in training and phasing of ship building programs, the needed manpower can be provided.

4. Legal Implications

Only two legal difficulties appear as an impediment to extended application of civilian manning and both are concerned with the use of Commercial Contract crews. One, is the ASPR disallowance of any contracts which have the appearance of a personal services contract as in the case of contracting for a crew which will be closely supervised during UNREP operations. The other difficulty is the lack of U.S. Coast Guard certification of fleet support ships which would expose the government to unlimited accident liability. Both these difficulties are amenable to

solution through either legislation or contractual agreements.

5. Navy Career Management Implications

Complete conversion of the 95 ships of this study to civilian manning would present a serious loss in training capability through the elimination of about 25,000 enlisted billets and 85 Command billets. In addition, the Navy would be faced with the eventual loss of all the skills unique to fleet support ships operations.

6. Survivability

The large reduction in personnel on civilian manned ships proportionately reduces the survivability/damage control capability of these ships.

E. REDUCED OPERATING STATUS

Because of the increased productivity of civilian manning there exists a possibility for cost savings during peacetime by placing ships which represent excess capacity in a Reduced Operating Status (ROS). Two cases were investigated; Case I which transferred 36 UNREP ships (7 AFS, 13 AO, 8 additional AO) to civilian manning and Case II which retained 3 AFS, 8 AE and 8 AO under Navy Military manning and transferred 4 AFS and 5 AE to Civilian manning and continued 8 AO under Civilian manning. Under Case I the possible annual reduction in undiscounted DOD cost is about \$150 million and in Case II it is about \$56 million. Not

included in these savings is the extended life expectancy of those ships placed in ROS.

F. TRANSITION TO WARTIME STATUS

Navy Military manning with its large manpower pool can fulfill the wartime OPTEMPO workload surge. The endurance of the smaller civilian crew may be over taxed, however, if required to surge for extended periods of time.

Both the Navy Civil Service and the Commercial Contract crew options would have trained reserve personnel which could be flown to the ships to augment the existing crews. With about 14 men needed per additional UNREP station, the total numbers of men who would have to be flown to these ships would not be excessive.

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